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\$900,000 Award Supports Photosynthesis Research

A \$900,000 grant from the McKnight Foundation has been given to the University of Illinois for research on photosynthesis. Donald Ort, associate professor of plant biology and coordinator of the McKnight program, believes that UIUC has one of the largest, most diverse, and most productive groups in photosynthesis research in the world. He traces the origins of this research to the 1950s when Robert Emerson and Eugene Rabinowitch developed an understanding of the energetics of photosynthesis. At that time, the Botany Department was housed in the Natural History Building, and Emerson, Rabinowitch and the members of the photosynthesis group worked in the basement of that venerable building. During the next thirty years, new buildings have been erected, and the School of Life Sciences, Department of Agronomy, U.S. Department of Agriculture, and others have cooperated to develop a concentration of investigators to continue the work begun by Emerson, the meticulous experimental plant physiologist, and Rabinowitch, the theoretical physicist.

Now there are fifteen independent laboratories, mainly in the School of Life Sciences and Department of Agronomy, doing research on all aspects of photosynthesis, ranging from field studies of crop canopies to the photo-physics of light absorption by photosynthetic pigments. Much of the success of photosynthesis research on this campus can be traced to the excellent interaction among laboratories involved in the



Don Ort, associate professor of plant biology, will coordinate McKnight Foundation award.

related research programs. The McKnight Foundation Award will allow these interactions to be extended across traditional boundaries of photosynthesis research by establishing a new program in interdisciplinary research and training in photosynthesis.

Ort explained that the McKnight Foundation, recognizing the key role basic plant science research makes in meeting the agricultural needs of the future, supports a limited number of programs to stimulate new efforts and interdisciplinary alliances. The purpose of the award to this campus is to promote new approaches in investigating photosynthesis, especially

as they pertain to agriculture, and at the same time to provide interdisciplinary training for students at the graduate and post-doctoral levels. Such a research and training effort is possible only at a university where there is an open atmosphere in which ideas are freely exchanged and techniques and equipment shared. These "vital elements for successful interdisciplinary research" are present at the University of Illinois, Ort reports, and were important factors in the granting of the Award.

According to Ort, recent advances in understanding the component processes of photosynthesis make it

both timely and feasible to establish a broadly based effort to investigate the integration of the central bioenergetics and enzymatic events of chloroplasts with the physiology of the cell and of the whole plant. The twelve participating faculty bring to the program expertise in the areas of energy conservation, electron and proton transfer, reductive and oxidative carbon metabolism, envelope metabolite transport, membrane composition, genetics, developmental and molecular biology, whole plant physiology and field photosynthesis. By fostering new research collaborations, with students as important participants, the program will provide for training of scientists with a broad background extending from molecular and developmental biology, biophysics and biochemistry, to the immediately applicable aspects of agronomy. Ort outlined several of the anticipated collaborations to illustrate the range of research topics envisioned under the McKnight Award.

One area of research will extend the recent collaborative work between William Ogren's and Archie Portis' laboratories which has resulted in the breakthrough discovery that a soluble stromal protein is the *in vivo* catalyst for the light-dependent activation of ribulose-1,5-bisphosphate carboxylase/oxygenase. This enzyme catalyzes the first step in both CO₂ reduction and photorespiration. Continuation of the Ogren/Portis collaboration and initiation of new collaborations will be directed at the investigation of the enzymology, genetics and molecular biology of activase. In collaboration with Dr. Orozco's laboratory, work will begin to isolate the nuclear gene coding for the activase polypeptide in order to study the developmental expression of the gene relative to other photosynthetic genes. Work will be initiated with Ort and Colin Wraight to investigate the requirement of a transmembrane electrochemical potential in the activation process. Photoautotrophic cell lines of soybean developed in Jack Widholm's laboratory will be ex-

ploited for further generation, and biochemical, molecular biological and genetic analysis of mutants. Cell-sorting techniques will be explored by Wraight to develop selection methods for new interesting mutants based on chlorophyll fluorescence parameters.

A second line of collaboration includes the light regulation of the development of the photosynthetic apparatus and genetic controls of photosynthesis. Plants in any community, and particularly in a dense agricultural monoculture, experience a constantly changing light environment. Leaves that develop soon after germination in full sunlight are later shaded as the canopy develops. Later leaves may develop and spend the entire growing season either in full sun or in very attenuated light. Very little is known about the consequences of these factors for whole plant photosynthesis or the ways in which individual leaves or whole plants change with the environment. The approach will again build on the broad expertise in the different research groups, creating an interaction between labs primarily concerned with problems in development, with bioenergetics and membrane reactions, and with the photosynthetic performance of plants in the field. On a developmental time scale, response of the photosynthetic capacity to light involves changes in the expression of specific genes. The molecular level control of this is the primary research focus of Dennis Buetow's laboratory using the photoautotrophic soybean cultures developed by Widholm's laboratory. The tissue culture and protein biochemical techniques will be further combined with the biophysical techniques available in John Whitmarsh's lab to determine the functional relationships of electron transport components in controlled environment conditions. Finally Hesketh's group will also collaborate to conduct a closely related study of the effects of light intensity and spectral distribution on photosynthetic performance of whole plants under field conditions.

A third area of collaborative research will investigate the effect of environmental stresses on the component reactions of photosynthesis. It has always been a problem, when studying stress-induced perturbations, to distinguish between changes which are the direct result of the stress, and changes which are secondary responses. Similarly, it is difficult to discriminate between changes in the reactions of photosynthesis which are caused by the environmental stress, and changes which are caused by the manipulations of the plant tissue in an experimental procedure designed to study that stress. Both of these problems have been difficult to solve because of the lack of suitable techniques to probe the process of photosynthesis *in situ*. During the past several years several of the collaborating laboratories have developed techniques which are providing solutions to these problems. Professors Crofts, Govindjee, Ort and Whitmarsh are developing such techniques, which include kinetic absorption spectroscopy, flash fluorescence, and gas analysis.

Though the research being done by the photosynthesis group is basic research, Ort says that it is being done in an atmosphere which is "... sympathetic to agriculture." He continues, "We are very excited about the potential that the kinds of things we do may someday have for agriculture." Ort's own research is on the effect that chilling has on the photosynthetic rate of the whole plant. John Cheeseman studies the effects of soil salinity, which is the major soil limitation worldwide. John Hesketh is interested in the effects of drought stress on soybeans. Ort, Crofts, and Wraight investigate the effects of herbicide resistance on whole plant photosynthetic rates. William Ogren and John Hesketh collaboratively research the consequences of increasing atmospheric CO₂.

Metcalfe Marks Fortieth Year in Academia

In 1986 Robert L. Metcalf marks his fortieth anniversary in academia. His entire life has been spent in the scientific environment, with only a small portion of it outside academia. His association with the University dates back to 1921, when his father, Clell L. Metcalf, came to the University with his family from Ohio to become Professor and Head of the Department of Entomology.

Now, sixty-five years after his arrival in Urbana, Dr. Metcalf has more titles than any faculty member on the Urbana-Champaign campus. He is the *only* Professor of Biology, as well as being a Professor of Entomology, Agricultural Entomology, Environmental Studies, Veterinary Biosciences, and the Center for Advanced Studies. In addition, he is a Principal Scientist at the Illinois Natural History Survey.

In this time of frequent individual and institutional discussions of early retirement, it seems appropriate to take a closer look at the person and the career of this man, who says "I could never just retire."

Metcalf grew up in Urbana. He attended Urbana High School rather than University High School because "Uni High didn't have a band or a sports program at the time." Both activities were important. He had played golf since he was 6 years old and the clarinet since he was 12. While at Urbana High he was active in both and also played in city and state golf tournaments.

However, according to Professor Metcalf, the most significant thing about his attending Urbana High is "That's where I met my wife, Esther, — in typing class. She's the only girl I ever asked for a date." They have been married 45 years. Besides their personal lives, they share their professional lives as research collaborators.



Robert L. Metcalf, professor of entomology

Metcalf completed both his Bachelor of Arts and Master of Arts degrees on this campus. As an undergraduate, he played on the varsity golf team and was a member of both the concert band and the Marching Illini.

His father apparently was an astute psychologist, as well as an eminent entomologist. Metcalf says, "I did my bachelor's degree in chemistry. My father never forced me about entomology. He quietly exposed me to it. Then after my B.A. degree, I realized the best use of my chemistry was in entomology."

After his master's degree, Metcalf spent 3 years at Cornell University completing his Doctor of Philosophy, which he received in 1943. During the following 3 years he served as an Assistant and then Associate Entomologist with the Tennessee Valley Authority in the South, experimenting with the application of DDT. One of the major concerns of the TVA at that time was the development of methods for the protection of U.S. troops against malaria-carrying mosquitoes on the beachheads of the South Pacific, where Dr. Metcalf says, "There were more mosquitoes than enemies."

"During this period, we did the first aircraft dispersal of DDT and the first house to house spraying of DDT in the U.S. In some of the houses without screens, there were 400 to 800 blood-engorged mosquitoes per room.

"One of the fellows even sprayed a traveling side-show strip teaser, because the mosquitoes were so bad that she could hardly stand to perform," he laughs. Then on a more serious note, he adds, "We sprayed *everything* before we knew the adverse effects of DDT."

In 1946, at the end of the war, Metcalf had offers from the Illinois Natural History Survey and the University of California, Riverside. He went to California because his wife said, "We've never been west of the Mississippi. Let's try it for a year." A year turned into twenty-two.

At Riverside, Professor Metcalf began his forty years in academia, including administrative positions as Chairman of the Entomology Department from 1951 to 1963, as Vice Chancellor for Academic Affairs from 1963 to 1966, and as Vice Chancellor for Research from 1966 to 1968. More importantly, he feels, he began his research and teaching career, which has centered around the chemistry and toxicology of insecticides, environmental toxicology, insect physiology, medical entomology and insect control.

Dr. Metcalf is highly regarded for his discovery of the carbamate insecticides and the early recognition of the magnitude and complexity of the ecological problems arising from the tremendous increase of new chemicals entering the environment. Roughly one hundred and seventy-five of his nearly four hundred publications were completed during his early career while at Riverside.

During this same period he served as president of the Entomological Society of America in 1958, and received the following awards: Faculty Research Lecturer, U. of C., Riverside, 1959; Order of Cherubini, Uni-

ersity of Pisa, Italy, 1966; the Charles F. Spencer Award, American Chemical Society, 1966; and the Chancellor's Award for Excellence in Research, U. of C., Riverside, 1967. Professor Metcalf also was elected to the National Academy of Sciences in 1967.

Because of the population explosion resulting in increasing environmental and societal problems in California, the Metcalfs decided in 1968 to return to the University of Illinois. "We decided California wasn't the best place to raise our family," he says.

Here, in 1970, Metcalf accomplished the work for which he is best known — the construction of a laboratory model eco-system, which permitted studies simulating the processes in nature and specifically to compare quantitatively the environmental properties of DDT and certain of its analogs. These screening studies led to an equally important, if not more important, contribution — his discovery of biodegradable DDT substitutes, which have persistence necessary for pest control application, but at the same time are environmentally acceptable.

The model eco-system, created to screen new candidate pesticides for environmental toxicity, was quickly accepted by the World Health Organization as one of its major assay systems for toxic substances and in general has been an economic tool for control agencies in need of hard data.

"Metcalf's eco-systems and the synthesis of a number of DDT-related biodegradable insecticides both have been most significant to agriculture and specifically to food production," Professor Stanley Friedman, Head of the Department of Entomology, has stated. "The importance of our agricultural enterprise to the world cannot be overestimated, nor can the importance of maintaining agricultural production

at an optimal level with the least possible damage to the environment. Dr. Metcalf made a firm commitment to assist in this endeavor, and these two contributions more than fulfilled that commitment."

Professor Metcalf apparently did not consider these contributions as fulfillment of his commitment. He has served, and continues to serve, in an advisory capacity for numerous national and international organizations and committees concerned with environmental problems.

His continuing contributions have been recognized by the American Chemical Society's International Award in Pesticide Chemistry, 1972; the American Mosquito Association's Meritorious Service Award, 1976; and the Entomological Society of America's CIBA Geigy Award, 1977 and Memorial Lecturer Award, 1978. In 1979, he was named as an Honorary Member of the Entomological Society of America and received the Distinguished Lectureship Award of the School of Life Sciences. He also was named as a Fellow of the American Academy of Arts and Sciences in 1980, was designated as Distinguished Professor of Biology on this campus in 1981, and received the Founder's Award of the Society of Environmental Toxicology and Chemistry in 1983.

While active in research and advisory activities, Professor Metcalf served as Head of the Department of Zoology from 1969 to 1972 and has directed seven postdoctorates, twenty-nine Ph.D. candidates, and five Master's candidates since returning to the University of Illinois.

He also is an enthusiastic and dedicated classroom teacher. Friedman says, "In spite of all of his consulting activities, Bob never schedules anything which causes him to miss a class when he's teaching." And Metcalf says, "I'm probably the only professor on campus who has the privilege of teaching in those marvelous old rooms up in the eaves of the Natural History Building where my dad taught over sixty years ago. Those rooms hold many good memories for me."

Metcalf, the active researcher and teacher, shows no signs of slowing down." "I could never just retire," he says. "Research is the best application of problem solving — better than chess or anything else I can think of. I would do research if I had to pay for it myself."

It is unlikely that Professor Metcalf ever will need to pay for his own research or look for space. As the head of Entomology, Friedman says "I'll press Bob to continue and will do everything I can to support him as long as he wants to work. He and his work are too valuable to the department and to the University."

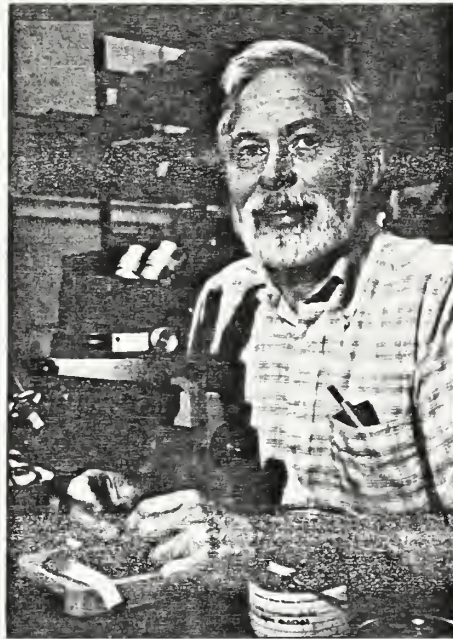
This article, written by Helen E. Hess, Assistant Director of the School of Life Sciences, originally appeared in Life Science News, a publication prepared for SOLS faculty and staff.

New Director for Museum of Natural History

For Thomas Uzzell, the new Director of the Museum of Natural History, museums are valuable institutions that serve the interests of both the public and the scientific community. He has begun planning events and programs to serve both of these groups.

On May 8, the museum hosted a public lecture by Robert McCracken Peck entitled "The Discerning Eye: Three Hundred Years of Wildlife Painting in America." Peck, a Fellow at The Academy of Natural Sciences at Philadelphia, has applied his academic training in art history, archeology, and American history to a career in the natural sciences. He has written articles for natural history and art magazines, and is the author of *A Celebration of Birds: The Life and Art of Louis Agassiz Fuertes*. His lecture pointed out that as the understanding of bird morphology, behavior, and classification changed, artists' depictions of birds also changed. The lecture was held in conjunction with the opening of a new display of bird paintings. Some years ago, the museum was given a set of prints of state birds painted by Richard Sloan for the Nature Society in Griggsville, Illinois.

Since Uzzell's arrival in October of 1985 at the Urbana-Champaign campus, the museum has become a focal point for a diverse group of researchers, all of whom share an interest in the use of biochemical methods for establishing phylogenies. Coming from several departments within the School of Life Sciences, and from Geology, the Natural History Survey, and Veterinary Pathobiology, they form the Molecular Phylogeny Group. The questions which are asked in creating phylogenies are: "If you have three kinds of organisms, which two are more closely related? Which one is more distant?" Traditionally, these questions have been answered by studying the morphological characteristics of living organisms and of fossils. Now the techniques of mo-



Professor Thomas Uzzell, director of the Museum of Natural History, studies the evolutionary history of amphibians.

lecular biology are enabling biologists to use new criteria to evaluate traditional phylogenies, and to describe possible relationships among organisms where none existed before.

One of the molecular techniques available to biologists is ribosomal RNA sequencing. Uzzell's hope and goal is to obtain funding for a ribosomal RNA sequencing laboratory for the use of the Molecular Phylogeny Group and others who are investigating the origins and diversifications of eukaryotic organisms. This group chose to study ribosomal RNA rather than DNA because the sequencing process for RNA is rapid and technically fairly simple. Once the sequencing is complete, the researchers can compare the nucleotide sequences, and make judgments about the evolutionary relationships among organisms. Uzzell emphasizes the appeal of this methodology. He says, "You sense that you're looking directly at genetic material, rather than counting bristles or hairs."

But Uzzell is quick to point out that sequencing genetic material can raise as many questions as it answers. He says, "We get fantastic

information from these procedures, but they do not solve phylogenetic problems." In some cases the biochemical techniques produce data that are congruent with that derived from other sources. Other times the results are in conflict, and more research must be done.

One important value of the biochemical data on systematics, according to Uzzell, is that, since the genetic distances among organisms appear to be largely time-dependent, the data "... are enormously heuristic, forcing people to think much more openly about when things might have happened." He hopes to infuse that kind of thinking into the public aspect of the museum as well. Acutely aware that interpretations of data can change with time, he feels that part of the message of the museum should be: "This is what we believe now. Here's the evidence for it; there's the evidence against it." He is thinking about and planning now for an exhibit that would interpret for museum visitors the new understandings of systematics derived from molecular studies.

The museum now offers a Discovery Room to visitors, especially younger ones. Animals, both living and stuffed, rocks and shells, posters and drawings invite visitors to look, touch and smell. The Discovery Room is the creation of Sandra Batzli, the museum's volunteer coordinator. She is currently recruiting and training volunteers from the community and the university to lead groups of school classes and other groups of visitors on guided tours of the exhibits.

A dream of Uzzell's is to acquire the cast of a dinosaur skeleton for the museum. These extinct creatures never seem to lose their public appeal. "We don't have room, of course, for an apatosaur," says Uzzell, "but certainly we can make room for an *Avaceratops*." (The Academy of Natural Sciences of Philadelphia, where Uzzell served as Curator of Vertebrates before coming

to Urbana-Champaign, *does* have an apatosaur.) Plans for raising the funds to acquire a skeleton are still in the early stages, but Uzzell says anyone interested in this project, or any other aspect of the museum's development, is welcome to make a donation.

Special Awards and Prizes

John Becker (M.S. Physiology, Ph.D. '78), assistant professor of biology, Knox College, Galesburg, IL, was awarded The Phillip Green Wright Prize for Distinguished Teaching. He received this prize for non-tenured teachers on the basis of student evaluations.

Jane Billeter, a third year medical student at Rush Medical College, Chicago, was awarded third place in the Bernard M. Baruch Essay Contest for Medical Students, which is sponsored by the American Congress of Rehabilitation Medicine. Ms. Billeter also received the M.S. in Biology from UIUC in 1983.

Linda S. Klippert (B.S. 1972), a veterinary technician at the College of Veterinary Medicine, UIUC, was presented the Robert and Lucy Graham Award, an award made annually to the nonacademic employee who has made an outstanding contribution to the college.

Alonda Schutzmann, who teaches at Steilacoom High School, was selected the Outstanding High School Science Teacher of the State of Washington for 1985. The award was made by the Washington Science Teachers Association. Schutzmann did her undergraduate work in plant biology at UIUC, graduating in 1969.

Marjory Tunnell, biology teacher at Irmo High School, Ballentine, South Carolina, was named 1985 South Carolina Biology Teacher of the Year. She received the M.S. at UIUC in 1970.

Alumni News

Although some individual departments within the School of Life Sciences have kept in contact with their graduates through newsletters, SOLS had not had any communication with its alumni until the fall of 1985, when a copy of *Life Science News* was sent to all graduates for whom an address was available. We received many responses with information about professional activities. Lacking the space to print something from everyone, we chose to highlight alumni who are in academic positions. Future issues will feature other occupations and areas of interest.

Hussain Ali Abulfatih, (Ph.D. Plant Ecology '77), Associate Professor of Ecology, King Saud University, Abha, Saudi Arabia

Stephen Alexander, (B.S. Biology '71), Assistant Member, Department of Molecular Biology, Research Institute of Scripps Clinic, San Diego, Calif.

Richard R. Alman, (B.S. Physiology '68, M.S. '70, Ph.D. '72), Associate Professor of Biology, State University of New York at Buffalo, Buffalo, N.Y.

Curtis J. Baird, (Ph.D. Cell Biology '74), Assistant Professor of Anatomy, Loma Linda University, Loma Linda, Calif.

Meredith A. Behr, (Ph.D. Zoology/Immunoparasitology '79), Assistant Professor of Biology, Cameron University, Lawton, Okla.

Jacques Berger, (M.S. Zoology '58, Ph.D. '64), Department of Zoology, University of Toronto, Canada

Mitchell L. Berk, (B.S. '71, M.S. '73), Assistant Professor of Anatomy, Marshall University School of Medicine, Huntington, W.Va.

Ronald A. Brandon, (Ph.D. Zoology '62), Professor of Zoology, Southern Illinois University, Carbondale, Ill.

Paul L. Brown, (M.S. Zoology '48, Ph.D. '55), Dean, School of Arts and Sciences, Atlanta University, Atlanta, Ga.

Peter Bruns, (Ph.D. Cell Biology '69), Professor of Genetics and Associate Director of Biotechnology Program, Cornell University, Ithaca, N.Y.

Marjorie Cohn, (B.S. Biology '73, M.S. '74), Assistant Professor of Pediatrics and Microbiology, Georgetown University, Washington, D.C.

Asit Baran Das, (Ph.D. Physiology '65), Professor of Zoology, University of Visva-Bharati, Santini Ketan, India

Ralph W. Dexter, (Ph.D. Zoology '38), Professor Emeritus of Biological Science, Kent State University, Kent, Ohio

Scott Falkenthal, (B.S. Biology '73), Assistant Professor of Genetics, Ohio State University, Columbus, Ohio

George Garoian, (Ph.D. Zoology '56), Professor of Zoology, Southern Illinois University, Carbondale, Ill.

James A. Gessaman, (M.S. '64, Ph.D. Physiology and Zoology '68), Associate Professor of Biology, Utah State University, Logan, Utah

Ed Goebel, (M.S. Microbiology '75), Assistant Professor of Biological Sciences, Purdue University at Fort Wayne, Ind.

Roger A. Gorski, (B.S. Physiology '57, M.S. '59), Professor and Chairman, Director of the Laboratory of Neuroendocrinology of the Brain Research Institute, Los Angeles, Calif.

Julius S. Greenstein, (M.S. '51, Ph.D. Zoology '55), President, Central Ohio Technical College and Dean, The Ohio State University at Newark, Ohio

Hugh Hanson, (M.S. Zoology '41, Ph.D. '48), Professor Emeritus of Zoology, Arizona State University, Tempe, Ariz.

Alice Bourke Hayes, (M.S. Botany '60), Professor of Natural Science, Loyola University of Chicago, Chicago, Ill.

Richard L. Hurley, (Ph.D. Entomology '65), Professor of Biology, Humboldt State University, Arcata, Calif.

Marjorie A. Jones, (M.S. Microbiology '73), Assistant Professor of Chemistry, Illinois State University, Normal, Ill.

C. Leslie Kanatzar, (M.S. Zoology '36, Ph.D. '40), Dean of the College Emeritus, MacMurray College, Jacksonville, Ill.

Roger Lederer, (B.S. Zoology '63, Ph.D. '72), Professor of Biological Sciences, California State University, Chico, Calif.

Sue Y. Lee, (Ph.D. Zoology '68), Professor of Biological Science, Humboldt State University, Arcata, Calif.

Richard Lipton, M.D., (B.S. Physiology '75), Assistant Professor, Department of Neurology, Albert Einstein College of Medicine, N.Y.

Jordan L. Mann, (B.S. Biology '75), Clinical Assistant Professor of Pathology, Southern Illinois University School of Medicine, Springfield, Ill.

Charles F. Matz, (B.S. Botany '64, M.S. '66), City College of Chicago, Chicago, Ill.

John R. Meyer, (B.S. Biology Honors '69), Associate Professor of Entomology, North Carolina State University, Raleigh, N.C.

Steven J. Muzos, (M.S. Biology Education '73), Biology Faculty, Austin Community College, Austin, Texas

Dennis Nyberg, (Ph.D. Zoology '71), Associate Professor of Biological Sciences, University of Illinois at Chicago

David Regehr, (M.S. Botany '68, Ph.D. '75), Associate Professor of Agronomy, Kansas State University, Manhattan, Kan.

Kent E. Schwaegerle, (Ph.D. Plant Ecology '84), Assistant Professor of Botany, University of Alaska, Fairbanks, Ala.

Marlene V. Shaw, (Ph.D. Microbiology '69), Associate Professor of Life Sciences, University of Southern Indiana, Evansville, Ind.

Leonard A. Smock, (M.S. Zoology '70), Associate Professor of Biology, Virginia Commonwealth University, Richmond, Va.

Roger L. Storck, (Ph.D. Microbiology '60), Emeritus Professor of Biology, Rice University, Houston, Texas

Curtis J. Swanson, (Ph.D. Physiology/Zoology '70), Professor in the Division of Physiology and Biophysics, Department of Biological Sciences, Wayne State University, Detroit, Mich.

L. G. Swartz, (B.S. Zoology '53, M.S. '54, Ph.D. '58), Professor of Zoology, University of Alaska, Fairbanks, Alaska

Peter Tigchelaar, (Ph.D. Physiology '70), Professor of Biology, Calvin College, Grand Rapids, Mich.

Ralph Troll, (B.S. Zoology '57, M.S. '58), Professor of Biology, Augustana College, Rock Island, Ill.

Jean K. Tuech, (Ph.D. Cell Biology '71), Head, Biology Department, Christian Brothers College, Memphis, Tenn.

Bruce Waldman, (B.S. Biology Honors '75), Assistant Professor of Biology, Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, Mass.

Margaret A. Weck, (B.S. Biology '80), Assistant Professor of Biology, College of St. Rose, Albany, N.Y.

Philip B. Whitford, (M.S. Plant Ecology '42), Professor Emeritus of Botany, University of Wisconsin-Milwaukee, Wis.

E. Spencer Wise, (M.S. Plant Ecology '64, Ph.D. '70), Professor Emeritus of Biology and Environmental Science, Christopher Newport College, Newport News, Va.

Biology Honors Plans Reunion

Professor Judith Willis has received enthusiastic responses from over thirty alumni of the Biology Honors programs to her invitation to attend a 25th Anniversary reunion and symposium, scheduled for Friday and Saturday, April 17 and 18, 1987.

What began as a series of three introductory courses — The Cell, The Organism and Population Biology — designed to challenge students who had been well-prepared by post-Sputnik high school curricula quickly metamorphosed into an undergraduate honors major. In exchange for small classes and close contact with faculty, students have worked hard, taken essay exams, written term papers, and tended experiments at odd hours in the basement labs in Harker Hall.

Herbert Stern, now at the University of California-San Diego, and Dave Nanney of the UIUC Department of Genetics and Development, were the co-founders of the Biology Honors program. Willis says both will attend the reunion, and along with other Honors faculty, hear presentations by the program's graduates.

Willis says that so far responses have come primarily from M.D.s and Ph.D.s, and they have provided an impressive list of training and honors. She is anxious also to hear from alumni who are pursuing careers in business, the arts, and other less predictable areas. She also emphasizes that students who completed the Honors core program, but whose field of concentration was in an area other than biology, are invited to attend the reunion. Alumni lists are not perfect; any alumni who have not received an invitation may contact Professor Willis, 318 Morrill Hall, 505 South Goodwin Avenue, Urbana, IL 61801.

What is SOLS?

Several alumni who received the *Life Science News* last fall returned their information sheets with comments like, "What happened to Zoology?" "What is SOLS?"

In 1959, the School of Life Sciences brought together the departments of Bacteriology, Botany, Entomology, Physiology and Zoology under a single administrative umbrella. The goals of the reorganization were to coordinate the activities of these departments within the College, to promote cooperation among these departments with biologists in other colleges of the University, and to advance the interests of these departments in relation to agencies outside of the University. Since that date, further changes have occurred. Bacteriology became Microbiology.

The Zoology Department was, in effect, split and expanded into two new departments: Ecology, Ethology and Evolution; and Genetics and Development. The Department of Physiology grew to be the Department of Physiology and Biophysics, and Botany was renamed Plant Biology. The newest department is Anatomical Sciences.

The majority of undergraduates earn their bachelor's degrees in Biology General, an interdisciplinary program supported by all the life sciences departments. Undergraduates may also choose Biology Honors or Teaching of Biology as their field of concentration, or any of the departmental undergraduate programs. Each department offers graduate programs. Many also participate in interdisciplinary programs, such as Cell Biology, Neural and Behavioral Biology, and Plant Physiology.

These name changes reflect the rapidly changing nature of biology, and the University's effort to provide the most timely educational experiences possible for students.

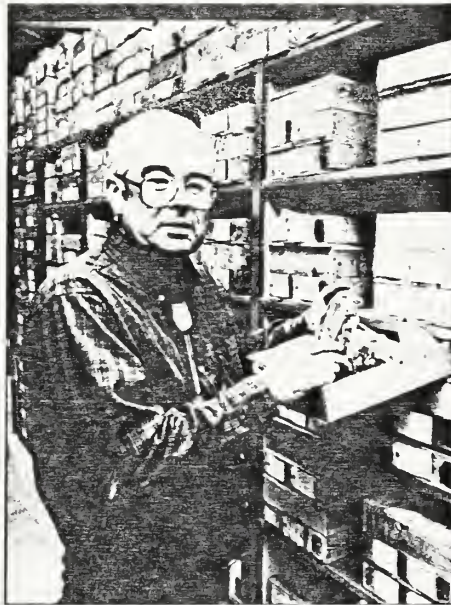
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New Building for Paleobotanical Collections

325 million years ago, lush stately swamps dominated by sixty-foot high lycopod trees and later, broad tree ferns, covered much of present day Illinois, southern Indiana and western Kentucky. Today fossils from this coal age in the form of coal balls — 200 tons of them — are housed in a newly-built warehouse on the University South Farms. Tom Phillips, professor and head of plant biology, is pleased to have a more permanent home for this enormous collection, after years of having to house it in hallways and in basements of a number of campus buildings.

Coal balls contain the peat stages, with exquisite to poor anatomical preservation, of the same plants from which coal is made. As the earth's upper crust forming a feature named the Illinois Basin subsided or the sea level rose, the deltaic and coastal swamps were drowned by floods of sea water, and the dead plants covered by layers of deposited sediment. Eventually the seas withdrew, allowing new freshwater swamps to grow. This process occurred many times during the Pennsylvanian Period, resulting in numerous layers of peat covered by sediment. Heat and compression resulting from deep burial converted most of the peat to coal, and the sediment to rock. A small amount of the peat, however, was entombed by carbonates and preserved in rock form, the coal balls, which are a great nuisance to coal miners, but are the bread and butter of paleobotanists.

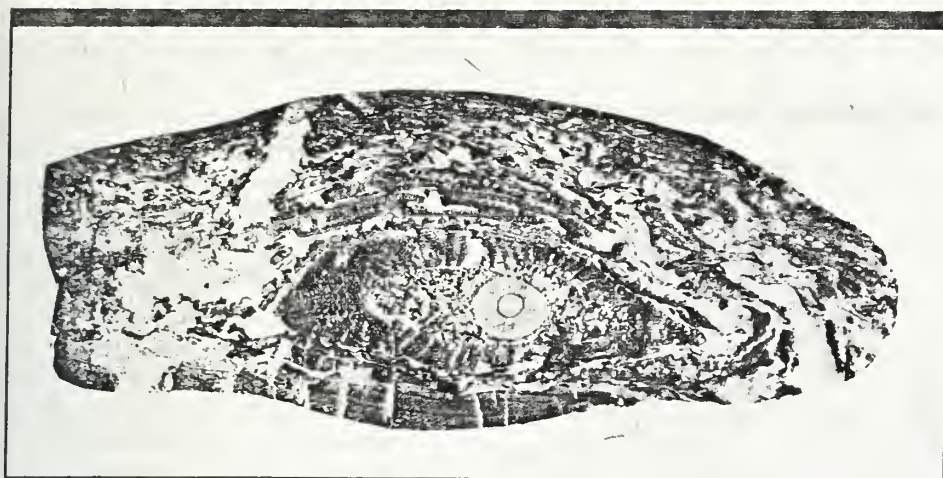


Tom Phillips is surrounded by paleobotanical specimens.

Phillips recalls that in 1961 he had not thought even to apply for the position in the Botany Department at the University of Illinois, even though it had a collection of 6,000 coal balls, a large number for that time. After all, there were already three paleobotanists in Urbana-Champaign: Wilson Stewart was Botany Department head; Ted Delevoryas has just moved to Urbana from Yale; and Bob Kosanke was the coal palynologist at the Illinois State Geological Survey. All three are alumni of the Botany Department and were very well-known paleobotanists. Ironically, Phillips found his early years were consumed mostly by teaching, and his summer field work shifted to strata of the Devonian Period in the arctic

and the central Appalachians. It was largely a "gestation time" of gaining perspective of species and the evolution problems of the Pennsylvanian age plants while working with their ancestral groups of 400 million years earlier. He returned to Pennsylvanian coal-swamp research after the resident scholars had moved on to other institutions, and he shifted his approach to "vegetational studies." He said, "I was always hesitant to use the term 'ecology' because it implied that we had ecological hypotheses and were testing them. Actually we had enormous data potential for vegetational patterns and were nowhere near testing any ecological hypothesis! We can not directly measure a single parameter of the ancient environments — it is entirely deductive and relative as to cause-effect. What we were interested in was establishing patterns so we could dissect out species patterns on a geologic time scale — always the push to the barrier of evolutionary insight."

Research money was scarce in those early years, and Phillips remembers how important students were in moving the work along and keeping up morale. He said, "You've heard students say, 'Faculty made such a big difference in my life.' Well, students can make a big difference in your life. They can make it fun to come to your lab, fun to work on weekends, and fun to go on field trips." Phillips and his students spent one summer slicing and



Coal ball peel reveals structure of ancient plants.

making peels (very thin layers of fossil material lifted from the cut surface of a coal ball and imbedded in an acetate sheet) from tons of coal balls in the basement of Morrill Hall. This work led to a cover story in *Science* in 1974 that reported their discovery of a distinct pattern of change in the vegetation between the early part and late part of the Pennsylvanian: early and middle Pennsylvanian time was dominated by towering lycopod trees, whereas tree ferns were the most important plants in the later Pennsylvanian. This abrupt change, marked by mass extinction, was subsequently noted as the most significant time of floristic changes in both temperate and tropical paleocontinents; in the paleotropics it represented a shift from a very moist to a markedly drier environment. Phillips now believes that this paleoclimatic change resulted from key stages in the formation of Pangaea, an ancient supercontinent. The land mass of this continent was so vast that huge rainshadows formed, depriving the interior of the continent of rainfall.

Although the early results of the study were well received by the scientific community, there was a nagging concern by some that the needed quantitative work was "not feasible". Phillips delights in recounting how the first quantitative analysis was accomplished. Two

physicist friends took it as a challenge to develop the necessary computer capability to manipulate the enormous quantity of data. The result was a paper on the quantitative analysis of Pennsylvanian coal swamps. Phillips said, "People who read that paper still ask what happened to those two paleobotanists. I enjoy explaining that they are physicists."

More than ten years later, years he and his associates have spent studying the biology and distribution of the plants that constituted the coal-swamp communities, they have been able to work out many aspects of the ecology of coal swamps, but there is much yet to be done. There is now a fundamental data base for understanding such things as species diversity and turnover, relative nutrient availability, and reproductive strategies. He said, for example, that paleobotanists now see that most of the oddly shaped fruiting bodies of the lycopod trees functioned as "sailboats," effectively dispersing the organisms in the semi-aquatic environments.

From such an ecological base Phillips is moving toward an exploration of the pattern and process of the evolution of plants through the Pennsylvanian Period (about 35 million years). He points out that perhaps this interest in evolution is unavoidable, since he grew up in Tennessee, where, until 1969, state law forbade the teaching of evolution. He said "I

think, for me, it was a forbidden fruit." Among his current questions about the evolution of coal-swamp plants are these: When a plant disappears from the fossil record, is it because of extinction or just migration out of the environment being sampled? Does the appearance of new plants in coal swamps represent speciation there, or migration from other evolutionary centers? What effect did changes in paleoclimate or other major disruptive environmental conditions have on the timing of coal-swamp plant evolution? What understanding of evolution accounts for plants whose species characteristics remain unchanged for millions of years and why do we apparently see evidence of speciation at the same approximate time for different groups of plants in the coal swamps?

Phillips' work is also applied to coal geology. Studies of coal balls, fossil pollen, and the coal itself are used to quantify the vegetative constituents of particular coal seams. This knowledge is a crucial factor in reconstructing both environments of plant growth and peat accumulation which impart economically important characteristics to coal deposits. In addition, his understanding of the changes in paleoclimate can help predict where and how the coal characteristics should change stratigraphically and geographically.

He emphasized that much of what had been accomplished in recent years in paleobotany at the University "was feasible" because of the research and collections of his predecessors and the teamwork extended by many colleagues at the Illinois State Geological Survey.

Biotechnology Center Serves Industry and Campus

The Biotechnology Center at the University of Illinois has two missions: to serve as a liaison between industry and the university, and to support and enhance biotechnology research on the campus.

"We're here to provide a window into what is occurring on the campus — to help companies identify faculty members with whom they might collaborate," said Dr. Janet Glaser, assistant director of the Center. Because individuals in so many departments, from veterinary medicine to engineering, are doing research in biotechnology, Glaser's office provides a valuable service to industry.

In some cases, collaboration consists of an industrial researcher spending a few days in a university laboratory learning a new technique. In other cases, a company and a research laboratory may discover an area of overlapping interest, and enter into a cooperative research agreement. One example of such a collaboration is the work being done jointly on photosynthetic bacteria by Amoco Research Center and Professor Samuel Kaplan, who is also Director of the Biotechnology Center.

Two service laboratories are available for use by industry and faculty. The Genetic Engineering Laboratory offers DNA synthesis, protein microsequencing, peptide synthesis and amino acid analysis. All of these techniques are important to recombinant DNA technology.

The second service facility is the Cell Science Laboratory. Hybridoma cell lines which produce monoclonal antibodies are prepared for faculty by trained technicians. The laboratory also is equipped with laser-based instrumentation for sorting cells.



Dr. Janet Glaser coordinates activities of the Biotechnology Center.

All of this equipment and instrumentation is so expensive as to make it impractical for smaller individual laboratories, whether university or industrial, to buy such equipment. Through the Biotechnology Center, laboratories are able to use these facilities on a contract or fee-for-service basis.

Glaser believes that the Biotechnology Center can become a regional center, especially providing services to midwestern companies that are developing research programs using such techniques as genetic engineering, recombinant DNA, and cell fusion.

The Center supports biotechnology on the campus in many ways besides providing the service laboratories. The Campus-Wide Bio-Initiatives Committee, which controls the state funds available to the Biotechnology Center, is also able in some cases to provide start-up money for laboratory equip-

ment for new faculty, or to partially fund a salary line. This flexibility is very important in recruiting new faculty in a highly competitive field.

During the fall semester of 1985, the Biotechnology Center provided partial funding for a course taught by Robert Gennis of the Chemistry Department, but cross-listed in Biochemistry and Biophysics. Speakers came from many sectors of industry to talk to students about current industrial research using biotechnology. The talks included such topics as bio-processing, development of diagnostic kits, and use of recombinant DNA methods to develop therapeutics.

The University has always recognized its obligations in three areas: teaching, research and public service. Glaser sees the Biotechnology Center helping the University provide a very significant public service.

She said, "Traditionally, agriculture and engineering have done a good job of serving the public. The agriculture experiment stations and engineering experiment stations have always been outwardly focused — getting new technologies to the market place. Basic biologists have only recently taken that stand."

Now that there are immediate commercial applications for biological discoveries, the Biotechnology Center is helping faculty initiate contacts with industry that will see those technologies reach the consumer more quickly.

Alumni News

The Spring 1986 issue of the *SOLS Newsletter* included news on graduates who are working at colleges and universities. This issue features updates on alumni who are working in business and industry. We will continue to feature alumni news in future issues.

Holly D. Abrams, (B.S. '69), earned her Ph.D. in microbiology at University of Connecticut. She now is doing research on viral diseases in humans at the Hutchinson Cancer Research Center in Seattle, a division of Bio-Rad Laboratories.

Cecilia Babcock, (M.S. '76), works in chemistry at E. I. Du Pont de Nemours at Orange, Tex.

Babak Banapour, (B.S. '82), went on to earn a master's degree in cell and molecular biology at San Francisco State University and is a research associate in molecular virology at Gene Labs Technologies.

Alan L. Barry, (B.S. '78), is now a lawyer with the law offices of Wallenstein, Wagner, Hattis, Strampel & Aubel in Chicago.

Karen Blaskie, (B.S. '77), works as a laboratory technologist at Stepan Chemical Company.

Carol Boucek, (B.S. '72), received her master's in accountancy from DePaul University and currently is employed as a financial analyst with Rockwell International.

Kimberlie L. Cerrone, (B.S. '73), has also earned a master's in molecular biology, a master's in business administration, and a law degree. She is now a senior vice-president of Heath/Medical Investments, Inc. in California.

Frederick Y. Cho, (Ph.D. '68), is a department manager for Motorola, Inc. in Scottsdale, Arizona.

Stanley G. Coates, (B.S. '51), of Waupaca, Wisconsin, recently retired after 32 years as a salesman for Pfizer Laboratories.

Judith Wallach Cohen, (B.S. '83), works in research and development at Abbott Laboratories in Chicago.

Joseph Daujotas, (B.S. '75), is founder of Wisconsin Analytical, Inc. in Watertown, Wis., which provides analytical services for agricultural and food companies. Another division, Aquaguard, provides services for waste water analysis.

Patrick G. Donovan, (B.S. '77), is employed as a systems analyst by Westec Services, Inc. in California. He is also working on an M.B.A. degree at San Diego State University.

Michael Ebert, (B.S. '74), is a technical sales representative for chemical and pharmaceutical equipment in San Francisco.

Amy Evans, (B.S. '82), received a master's degree in computer science from UIUC, and is now a bioanalyst with Syntex.

Tom Ford, (B.S. '83), is a microbiologist working in quality assurance for Jewel Foods near Chicago.

Joan M. Frank, (B.S. '69), earned an M.B.A. degree at the University of Michigan and now is an accountant and financial analyst for GVA Consulting in Michigan.

Joyce Lowery Frank, (B.S. '81), is a sales representative for Gibco/BRL, Life Technologies, Inc., which provides products to universities, hospitals, and industry in New York.

Lori Friel, (B.S. '80), received her law degree from the University of Denver in 1983. She is an attorney with the Western Interstate Energy Board, working in the area of nuclear waste transportation law.

Nicole Hopkins, (B.S. '85), works as a technical assistant at Erie Casein Company, Inc. at Rochelle, Ill.

Joseph L. Lasky, Jr., (B.S. '71), is the chief medical technologist for Illinois Bell Telephone Company in Chicago.

Woody Lovacheff, (B.S. '77), earned an M.B.A. from the University of Wisconsin and works as a product consultant for Professional Computer Resources in Oak Brook Terrace, Ill.

Linda Merkel Maley, (B.S. '73), is a senior programmer and analyst at Quaker Oats Company, Chicago.

Douglas J. Mandel, (B.S. '73, M.S. '75), is employed as an information scientist by Abbott Laboratories in Chicago.

Barbara Mendius, (M.S. '77), earned a degree in computer science at the University of Oregon, and now is a software engineer and peace activist in Beaverton, Oregon.

Darryl A. Moy, (B.S. '78), earned a master's in exercise physiology from Northern Illinois University and works as an exercise physiologist for Cardio-Fitness Corporation in New York.

Kendall L. Page, (B.S. '76), is a laboratory analyst in quality control at A. E. Staley Manufacturing Co. in Lafayette, Ind.

Leslie Parenti, (B.S. '77), earned an M.B.A. from Loyola University and is an administrator for Arbitron Ratings Company in Chicago.

Deborah A. Paul, (M.S. '79), completed her doctoral work in biochemistry at the Medical College of Virginia, and is doing research on the HTLV-III virus at Abbott Laboratories in Chicago.

Lance G. Peterson, (Ph.D. '78), is an area research manager, Plant Science Field Research International at Eli Lilly in Indiana.

Margaret Polloway, (B.S. '85), is a scientific technician at Abbott Laboratories, working on a diagnostic test for the HTLV-III virus.

Susan Endres Ramsey, (B.S. '82), is a scientific programmer and analyst at Abbott Laboratories.

Jean E. Reiher, (B.S. '85), works as a quality assurance technician with Ingredient Technology Corporation in Des Plaines, Ill.

Laura Scanlan, (B.S. '79), earned her master's degree at Rush University and is a manager for Health Care Information Systems, Ernst & Whinney, in Chicago.

Cynthia Winkley Schopp, (B.S. '79), is a molecular biologist at Abbott Laboratories in Chicago.

Judith A. Scott, (B.S. '71), is an international quality assurance manager for Travenol Laboratories near Chicago.

Michael Shaughnessy, (B.S. '78), is employed as a regional sales manager by Wampole Laboratories in Chicago.

Nicholas R. Staten, (B.S. '85), is working for Monsanto Company in St. Louis as a research biologist.

Bonnie McWilliams Straton, (B.S. '75), is an educational consultant with Discovery Toys in the Chicago area; she is also co-owner of The Music Store in Matteson, Ill.

Karen Steiner Thirman, (B.S. '82), received a master's of public health degree and was employed as an environmental scientist for Environmental Consultants Technology in Ann Arbor, Michigan. She recently moved to Minneapolis.

Clifford J. Turner, (B.S. '82), earned a master's degree in immunology from Northern Illinois University and is a representative for Ortho Diagnostics Systems, Inc., marketing laboratory reagents such as monoclonal antibodies and DNA probes.

Michael W. Unger, (B.S. '72), earned his Ph.D. from the University of Washington, and is now the manager of clinical affairs at Hybritech Incorporated in San Diego.

Thomas E. Wheat, (Ph.D. '72), works as a regional applications biochemist with Millipore Corporation in Chicago.

Paula K. Wopat, (B.S. '77), works as a fermentation process development microbiologist for Genetics Institute, Inc. in Waltham, Mass.

Research from the Bug's Viewpoint

"The better remake of *The Fly* would have been from the fly's point of view. Imagine how horrible it would be for a fly to turn into a human, and lose its ability to walk on the ceiling."

Understanding the world from the insect's point of view pervades all the work of May Berenbaum, associate professor of entomology.

Berenbaum's research explores the chemical ecology of insects, providing information about the interactions between insects and their world.

One plant-insect interaction currently being studied is that between wild parsnip and the parsnip webworm.

Very little besides the parsnip webworm eats wild parsnip, not surprising since the plant produces a chemical which causes a distressing dermatitis, at least in people. The dermatitis is caused by a group of chemicals called furanocoumarins. (These phototoxic substances do their damage in the presence of sunlight, and are responsible for such unusual conditions as "celery-picker's itch," and "Club Med dermatitis," which results from overexposure to limes in tropical settings.) The webworm, however, seems to be entirely unaffected by these chemicals. Berenbaum and her students have determined the genetic basis of the production of the furanocoumarins and are now looking at whether or not the chemical composition of the plant population can exert selection pressure on the insect population.

Another question of interest that Berenbaum is exploring is this: why are plants so chemically complicated? Why do many have over 200 compounds in their volatile oils? She asked, "Is there an adaptive value, or is it just biochemical exuberance on the part of the plant?"

Her current research indicates that many of the "extra" chemicals act as synergists, potentiating chemicals that occur together. They themselves may not be toxic, but they enhance



May Berenbaum observes a tomato hornworm.

the toxicity of other substances. In the wild parsnip, for example, she and her students have found several compounds which synergize the furanocoumarins.

Berenbaum believes that the only hope for development of successful pesticides is to first understand the ecology, including the chemical ecology, of the pest. Use of chemical pesticides exerts selective pressure on the insect population, resulting sooner or later in the development of resistance in the insect to the toxicant. Successful pesticide control will necessarily involve prolonging the useful lifetime of the toxicant.

She said, "The toxicant is part of the organism's environment, so once you know how an insect relates to its environment, you have a weapon for managing insects."

Berenbaum has been honored with two awards that support her research. In 1984 she was named a Presidential Young Investigator, and in 1985 she was designated a University Scholar, for which the funds come from alumni gifts to the University.

Students Give Teaching Award



Roderick MacLeod begins a new semester.

The 1986 class of Alpha Epsilon Delta, a service fraternity for premedical students, in May presented its Outstanding Science Professor Award to Roderick MacLeod, associate professor of genetics and development. Each fall and spring semester MacLeod teaches a course in immunology to a class of eighty to one hundred students, mostly senior pre-meds. He said, "I get a very lively group of students, very hard-working and very pleasant to be with."

Class often begins with MacLeod enthusiastically waving a *New York Times* article on a new development in immunology at his students. Student interest isn't a problem for him, as the field is so dynamic.

In a rapidly changing field, however, there are situations when scholars must discard substantial amounts of information from past studies. MacLeod constantly emphasizes to students the need to synthesize and evaluate information from original scientific articles.

By encouraging his students to integrate their knowledge of genetics, biochemistry, anatomy, and physiology MacLeod tries to keep them

from sinking under the weight of immunology's huge vocabulary and collection of facts. "If they can see the whole picture of the body's defense mechanisms, it is much easier for them to understand the information . . . and retrieve it for an exam," he said.

Exams in immunology are always essays and short answers. "It's hard to fit all I've taught them on the bubble of a computer graded sheet," MacLeod said.

MacLeod grew up on one of the islands of the Outer Hebrides of Scotland, and for the last several years he has done broadcasts for the Scottish BBC. The BBC, he said, is interested in "... my view of the American people's reactions to situations that are of international importance." He said, "Their philosophy is that I should be more aware of what the American people think regarding certain situations than a reporter sent once for 48 hours and put up at the Holiday Inn would be." MacLeod does the broadcasts by telephone in the very early morning hours, to take account of the six-hour time difference between Inverness and Urbana.

Newspapers, television, and individuals all are sources for MacLeod's analyses. He said, "I had one of my

best interviews in the dentist's chair. Before he stuffed my mouth with cotton, I gave him a topic, and then just listened." His topics this year have included Libya, President Reagan's health, Hands Across America, and the space shuttle disaster, among many other topics of international interest.

Summer Apprentices Join Research Labs

Liza Franklin and Ted Tabe, summer apprentices in SOLS research laboratories, learned that there are stacks of plates to pour and hundreds of pipettes to fill on the way to exciting discoveries in biology.

Franklin and Tabe participated in a program sponsored by SOLS and the National Institutes of Health. Every year since 1980, Helen Hess, Assistant Director for Academic Affairs, has recruited a small group of highly-qualified minority students to spend their summer working in a laboratory. Hess says that the high school seniors she calls in March and April are usually surprised to be offered room, board, and a stipend for the summer, as well as the chance to get an early exposure to research.

Franklin, 18, graduated from St. Ignatius High in Chicago. Her father is a graduate of the University of Illinois, and she said, "I had always planned on coming here." She first visited the campus as a Presidential Scholar, and even an acceptance from Harvard did not change her plans. Franklin, who is planning on a career in medicine, worked in Dr. Carol Muster's laboratory. Muster's research involves looking for transposon mediated recombination events. Franklin's special project was



Liza Franklin

to construct a bacteriophage containing a transposon derivative, a project she successfully completed. Muster added, "She's so upbeat. She was wonderful to have around the lab."



Ted Tabe

Tabé, 17, went to high school at Fenwick in Chicago, having been born in Jerusalem and lived in a variety of places from Nigeria to Erie, Pennsylvania. He worked in Dr. Samuel Kaplan's laboratory, where the research focuses on membrane biogenesis in a photosynthetic bac-

terium and regulation of photosynthetic apparatus. Tabé explored the molecular biology of one component of the membrane using restriction analysis.

Both Franklin and Tabé adjusted easily to campus life, using the campus shuttle to get to meals at Pennsylvania Avenue Residence Hall, and taking advantage of IMPE. All the Summer Research Apprentices were housed at Daniels Hall, a residence hall for graduate students. Said Franklin, "We were the youngest ones there — we stood out."

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You're Never Alone on Saturday Night

Why? Because, says Abigail Salyers, you always have your colonic bacteria with you.

Salyers, associate professor of microbiology, studies the over four hundred species of bacteria that inhabit the human colon, a microbial ecosystem of considerable proportions.

She says, "The population of the human colon is one of the densest and most complex in nature. You've got about as many bacteria as you can pack into one site. Colon contents are almost thirty percent bacteria."

One member of this microbial ecosystem that is of particular interest to Salyers is *Bacteroides*, a genus of gram negative obligate anaerobes. The vast majority of colonic bacteria are anaerobes, and, of these, one-third are *Bacteroides*. Several species of *Bacteroides* are also largely responsible for infections resulting from leakage or perforation of the colon. The pathogenic species are particularly troublesome because they do not respond to many antibiotics. In addition, *Bacteroides* have been suspected of acting as a reservoir for antibiotic drug resistance in the colon, supplying, in a sense, drug resistances to other resident species through conjugation.



Abigail Salyers, associate professor of microbiology

She concludes from the research in her laboratory that *Bacteroides* do contain many elements capable of mediating conjugal transfer of antibiotic resistances among *Bacteroides*. Her research has also shown that the chromosomal elements involved in conjugal transfer can mobilize plasmids that allow *Bacteroides* to mate with *Escherichia coli*, an aerobic colonic bacteria. These experiments seemed to show, however, that the frequency of productive transfer, that is, where drug resistance is maintained in the second organism, is quite low.

Interesting as these results are, Salyers is more excited about the new technologies that she and others in her lab developed in the process of doing these experiments. For example, they developed shuttle vectors to move DNA in and out of *Bacteroides*, and also characterized the first *Bacteroides* transposon. (A shuttle vector is a plasmid that is maintained in more than one species or genus and can be transferred, "shuttled," between them.) Salyers is excited about these technologies because they provide a basis for genetic manipulation of *Bacteroides*.

In her work as a microbial ecologist, Salyers has come up against the limits of the ability of classical microbiology techniques to solve current problems. Culturing in plates and identifying species microscopically or biochemically are techniques that do not work effectively with colonic bacteria, which are difficult to grow (because they are sensitive to oxygen) and look so similar that species are difficult to distinguish visually, even in an electron micrograph.

She and her associates were forced to use molecular techniques to accomplish even such basic tasks as identifying species in a sample and estimating their relative levels. To do this, students developed species-specific DNA hybridization probes. Because *Bacteroides* species have diverged widely, they have relatively little homology, which allows the DNA fragment to identify only one species.

If the pathogenicity of some *Bacteroides* makes them our foes, they have other characteristics that make them our friends. New technologies are also helping to explore these friendlier associations between *Bacteroides* and us, their host.

Polysaccharides are about the only part of the diet that reaches the colon, where they provide a major source of carbon and energy in the very anaerobic environment of the colon. Salyers is using the polysaccharide-degrading activities of *Bacteroides* as a model system that will then be used to study other biochemical activities of the bacteria.

In the course of exploring the process of polysaccharide degradation, Salyers and her associates have purified and characterized several of the enzymes produced by the cell. Now they are beginning to use antibodies to these purified enzymes to determine what *Bacteroides* genes are expressed in the colon.



Southern blot reveals distribution of homologous DNA fragments to Salyers and Nadja Shoemaker, a research specialist

Eventually these and similar probes may make it possible to determine what the bacteria are actually doing in the colon.

Salyers' research has also addressed such mundane questions as: Should we eat more yogurt to influence the intestinal population? What about including more fiber? She, along with other investigators, has concluded that changes in an individual's diet produce very little change in the colonic flora. Rather she believes that the bacterial population of the colon changes its biochemical activities in order to adapt to new environmental conditions produced by changes in diet. This biochemical flexibility is what allows the colonic flora to remain such a stable population. It is important, of course, for the host that such a large resident population be so stable; otherwise, the host is vulnerable to colonization by other, possibly less benign, organisms.

A more serious health concern is the relationship between colon cancer and a high fat, low fiber diet. At this point, Salyers says, there is no

satisfactory explanation for this observed link. She points out that, although some colonic bacteria do show mutagenicity on the Ames test, the mutagens have not yet been proven to be carcinogens and the precursors are unknown.

Salyers regards microbial ecology as one of the great frontiers remaining in microbiology, and believes that the problems to be solved are at least as complex as those involved in understanding eukaryotic systems. Fortunately, the molecular tools being developed hold out the hope that the problems can be solved.

New Fermentation System In Operation

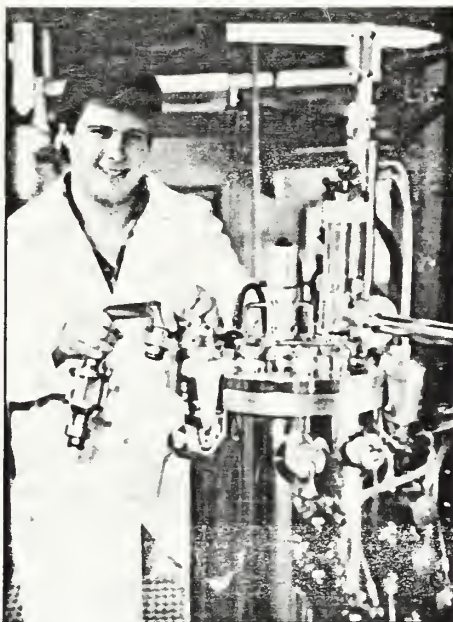
Large quantities of uniformly grown cells are now available to researchers, thanks to an advanced fermentation system installed last fall.

Fermentation takes place in four tanks, the largest of which is made of stainless steel and has a working volume of 200 liters. There are also two 20-liter stainless steel tanks. The fourth tank, which is used to grow photosynthetic bacteria, is made of glass and is used with a foam-insulated light mantle.

The system, which was tailored to the specific needs of research programs using it, was installed by B. Braun Instruments. Funds for its purchase came from a grant from the National Science Foundation, along with monies from the microbiology department, Illinois Biotechnology funds, College of Engineering, College of Liberal Arts and Sciences, the campus Research Board, and SOLS.

Steve Sharon, fermentation specialist for the microbiology department, is responsible for the day-to-day operation of the fermenters. Sharon is a recent graduate in chemical engineering from the University of Virginia. His master's thesis was on fermentation using fungi, so his early weeks at Illinois were spent in the laboratories of Sam Kaplan and Jordan Konisky, catching up on bacteria.

Sharon points out that there are many features of the system that make it so sophisticated. All the tanks are equipped with electronic probes and sensors that measure dissolved oxygen and carbon dioxide, redox potential, pH, and temperature. Sterilization of the tanks is controlled by on-board computers.



Steve Sharon, fermentation specialist

The entire system is monitored by two Hewlett-Packard computers, a design feature that Bill Shepherd, research specialist in microbiology, says makes it "an elegant system." The hook-up between the computers and the tanks enables the system to measure and control many variables, as well as provides a record of environmental conditions within the tanks at any point. (He also points out that the system allows the operator to go home at night, even when a run is in progress.) Shepherd was responsible for overseeing the acquisition and installation of the equipment.

Another special feature of this fermentation system is apparent in the astonishing network of copper pipes that covers the walls of the laboratory. All the tanks are connected to an elaborate gassing system that can supply them with any mixture of hydrogen, carbon dioxide, nitrogen, oxygen, and hydrogen sulfide. This gassing system is particularly important in culturing anaerobes, the object of research interest in several microbiology laboratories.

Methanogens, which are methane-producing anaerobes, present some challenges to the fermentation system, and have required some special features. Methanogens grow on a substrate of carbon dioxide and hydrogen. The presence of so much hydrogen made it necessary to install a special exhaust system, and also sensors that sound a warning if hydrogen is detected in the fermentation room. Methanogens have a doubling time four times as slow as that of aerobic bacteria. Steve Sharon is currently working on ways to increase the solubility of hydrogen in the tank, a change that might increase the rate of cell growth of methanogens.

Jordan Konisky, head of the microbiology department, has plans to develop a laboratory course to introduce students to fermentation. He envisions students learning about the culture of some economically important microorganisms, as well as doing genetic manipulations, for example, increasing the yield of a desirable by-product. They would also be able to learn the stages involved in moving from bench-top culture methods to scaled-up bioprocessing.

There is campus-wide interest in bioprocessing. Three faculty are currently being recruited for a program that will be housed in the College of Engineering.

Alumni News

This issue features news from alumni working in the many health and medical professions. If you have acquired another degree or a new position since we last heard from you, please send an update to include in the next issue.

Kenneth Adams (B.S. '85) is a student at Washington University School of Medicine, St. Louis, Mo.

Phillip Alscher (B.S. Physiology '84) is a student at the College of Medicine, University of Illinois at Chicago.

Deborah L. Stewart Anderson (B.S. Microbiology '74, D.M.D. '77) is a dentist in private practice and teaches at the Southern Illinois University-Edwardsville School of Dental Medicine.

William B. Baker (Ph.D. Physiology and Biophysics '71, M.D. '75) is now involved with patient care and clinical research at the Danville Urologic-Nephrologic Clinic, Danville, Va.

Craig L. Bartos (B.S. Physiology '77, M.D. Rush Medical Center) is a physician in family practice at the U.S. Air Force Hospital, Castle, Calif.

Carolyn Scharf Brecklin (B.S. Microbiology '82) is a student at the College of Medicine, University of Illinois at Chicago.

David Brottman (B.S. Biology Honors '83) is a student at Stritch School of Medicine, Loyola University, Maywood, Ill.

Randall L. Busch (B.S. Biology '83) earned his D.D.S. degree at the University of Illinois College of Dentistry and is now a student at Chicago Medical School.

Kevin C. Carney (B.S. Biology '79) received his M.Sc. degree from the Liverpool School of Tropical Medicine, and is currently a student at Stritch School of Medicine, Loyola University.

Elaine M. Carroll (B.S. Microbiology '85) is a medical student at Rush University, Chicago, Ill.

James L. Caruso (B.S. Biology '84) is a student at the Rockford campus of the University of Illinois College of Medicine, and an officer in the U.S. Navy Reserve.

Linda M. Cesnauskas (B.S. Biology '81, D.V.M. '85) is associated with the Burbank Animal Hospital and Bird Clinic, Burbank, Ind.

Joseph I. Clark (B.S. Biology '84) is a student at Stritch School of Medicine, Loyola University, Maywood, Ill.

Pamela Cools (B.S. Biology '84) is studying dentistry at the University of Illinois at Chicago College of Dentistry.

David J. Cziperle (M.S. Physiology '84) is studying medicine at Stritch School of Medicine, Loyola University, Maywood, Ill.

Timothy J. Driscoll (B.S. Biology '82, D.D.S.) has opened a dental office for general family care in Addison, Ill.

David Dungan (B.S. Microbiology '84) is a student at Stritch School of Medicine, Loyola University, Maywood, Ill.

Jeffrey A. Engelhardt (B.S. Microbiology '76, M.S., D.V.M.) is now a postdoctoral fellow at Purdue's School of Veterinary Medicine, where he is studying the effects of mycotoxin on liver and kidney disease of domestic animals and aquatic species.

Cheryl L. Fox (B.S. Biology '79) received her D.V.M. in 1981. She resides in Albuquerque, New Mexico.

Larry A. Fox (B.S. Biology '83) is a student at Chicago Medical School.

Paul Garbe (B.S. Biology '73, D.V.M. '77, M.P.H. '82) is a veterinary epidemiologist at the Centers for Disease Control in Atlanta.

James P. Gasparich (B.S. Biology '75) received his M.D. degree from the University of Chicago, and is a urologist practicing in Seattle, Wash.

Grant H. Geissler (B.S. Physiology '81, M.D. '85) is a resident in surgery at Parkland Memorial Hospital, Dallas, Tex.

James M. Gilchrist (B.S. Biology '76, M.D. '79) is an assistant professor of medicine (neurology) at Duke University Medical Center.

Jeanne Bullock Goldberg (B.S. Physiology '69) received her M.D. from Northwestern University and is a diagnostic radiologist at Decatur Memorial Hospital, Decatur, Ill.

Christine E. Haag (B.S. Biology '83, B.S. Physical Therapy '85) is a staff physical therapist at Rush-Presbyterian St. Luke's Medical Center, Chicago, Ill.

Christine L. Haag (B.S. Biology '82, D.D.S. '86) is now serving a general practice residency in dentistry at Illinois Masonic Medical Center in Chicago.

Janet Paral Harmeson (B.S. Biology '70, M.S. Zoology '72, D.V.M. '78) is a veterinarian at a clinic in Aurora, Ontario, working with horses and small animals.

Marie Sandy Henson (B.S. Biology '81, B.S. Physical Therapy '85) is working at Wake Medical Center, Raleigh, N.C.

David Hoban (B.S. Microbiology '75) earned his M.D. at the University of Chicago and is an anesthesiologist in San Diego, Calif.

David B. Huebner (B.S. Physiology '78) is a doctor of podiatric medicine; he is in a surgical residency program at St. Anne's Hospital West in Northlake, Ill.

Sheila Huelsman (B.S. Biology '83) completed her studies in veterinary medicine at the University of Illinois in May 1986.

Janet Beck Jakupcak (B.S. Biology '72, M.D. '79) is a family practice physician in Marseilles, Ill.

Barbara G. Jericho (B.S. Biology '85) is a student at Rush Medical College, Chicago, Ill.

Barbara Noyszewski Johnston (B.S. Biology '82, M.D. '86) is doing a residency in pediatrics at University of Illinois hospital.

Carol L. Kadow (B.S. Biology '72, D.M.D. '83) is a dentist with the U.S. Air Force.

Mary M. Kalinski (B.S. Biology '81) is now a nuclear medical technologist at St. Francis Hospital, Blue Island, Ill.

John D. Kazanowski (B.A. Biology '81, D.D.S. '84) works as a dentist in the north suburbs of Chicago.

Elizabeth M. (Konitzer) Kellogg (B.S. Microbiology '77, M.S., D.M.D.) has practiced dentistry and is now a resident in orthodontics at the Mayo Clinic, Rochester, Minn.

Michael J. Kelly (B.S. Biology '79, M.D. '83) is a physician in Davenport, Iowa.

Karena A. Klopp (B.S. Biology '85) is a medical student at the University of Illinois at Chicago.

Jeffrey D. Kopin (B.S. Biology '80, M.D. '84) is a resident in internal medicine at Northwestern Memorial Hospital, Chicago.

Ann Krilcich (B.S. Microbiology '77) is a clinical microbiology supervisor in a Chicago hospital laboratory.

Robert Bruce Lee (B.S. Biology '71, M.D. '75) is a family practitioner with a group practice in Pittsfield, Mass.

Frederic E. Levy (B.S. Biology '83) is a student at Rush Medical School, Chicago, Ill.

Lynn Levy (B.S. Biology '81, D.V.M. '85) is a veterinarian at Becker Animal Hospital in Northfield, Ill.

Faye Licata (B.S. Biology '84) is a student at Southern Illinois University School of Dental Medicine.

Brian K. Locker (B.S. '81, M.S. Biology '83) is a student at Rush Medical College, Chicago; he will begin a residency in obstetrics and gynecology at Keesler Air Force Base in Mississippi in July.

Mark Loehrke (B.S. Biology '77, M.D. '81) is in private practice in Owatonna, Minn.

Jeffrey T. Mack (B.S. Biology '74, B.S. Pharmacy '80) is a consultant pharmacist and manager of the Reno branch of Medi-Save Pharmacies, Inc. in Nevada.

Peter A. Marzek (B.S. Biology '81, M.D. '85) is a resident in general surgery at the University of Louisville Affiliated Hospitals.

Gina M. Moresco (B.S. Genetics and Development '85) is working on a master's degree in genetic counseling at the University of Colorado Health Sciences Center.

Mary K. (Tempel) Mortland (B.S. Microbiology '71, M.T., M.S. Microbiology/Immunology) works in the microbiology laboratory of Burnham Hospital in Champaign, Ill.

Maryann Nedorost (B.S. Biology '84, B.S. Physical Therapy) works as a physical therapist with severely handicapped children in the Chicago area.

Chris P. Poirot (B.S. Biology '78, M.D. '82) is a private family practitioner in Carlinville, Ill.

John H. Pollreis (B.S. Biology '81, D.V.M. '85) is a resident veterinarian for a corporate cattle feedlot and ranch operation in Nebraska.

Blair I. Reuben (B.S. Biology '79, M.D. '83) is currently chief resident in pathology at Harbor-UCLA Medical Center.

Walter F. Rongey (B.S. Biology '83) is a senior at Southern Illinois University School of Dental Medicine.

Toby R. Sadkin (B.S. Genetics and Development '84) is a student at Rush Medical College in Chicago.

Tracy G. Sanson (B.S. '81, M.S. Biology '83) is a student at the College of Medicine, University of Illinois at Chicago.

Jacqueline K. Sasuta (B.S. Microbiology '83, M.T.) is employed in the clinical chemistry laboratory of Methodist Hospital, Texas Medical Center in Houston.

Alok C. Saxena (B.S. Physiology '82, M.D.) is an intern in internal medicine at William Beaumont Army Medical Center in Texas.

Brian Scanlan (B.S. Biology '79, M.D. '83) is a resident in radiology at the University of Chicago Hospitals.

Timothy J. Schwartz (B.S. Biology '74, D.D.S. '79) is a dentist in Pekin, Ill.

Marc Sharfman (B.S. Biology '83) expects to receive his M.D. degree from Chicago Medical College in June 1987.

Cheryl Siegelman (B.S. Biology '79, B.S. Nursing '84) is a nurse at Children's Memorial Hospital in Chicago.

Jan V. Silverman (B.S. Ecology, Ethology and Evolution '77, M.S. Public Health '81) is a student at West Virginia School of Osteopathic Medicine.

Robert Mason Smith (B.S. Zoology '74, M.S. Animal Science '75, D.V.M. '80, Ph.D. '86) is an assistant professor of food animal medicine, surgery, and nutrition at the University of Illinois College of Veterinary Medicine.

James Lee Swingler (B.S. Microbiology '75, M.S. Microbiology '76, M.D. '80) has a private practice in obstetrics and gynecology in Peoria, Ill. He is also a clinical associate instructor at University of Illinois College of Medicine at Peoria.

Annette G. Teope (B.S. Genetics and Development '85) is pursuing a master's degree in microbiology at Texas College of Osteopathic Medicine.

anice Turner (B.S. Ecology, Ethology and Evolution '85) is working towards a master's in public health at the University of Illinois at Chicago.

Vincent Versaci (B.S. Biology '83) is a student at the University of Illinois College of Dentistry, Chicago.

David Weiss (B.S. Physiology '78, M.S. Biology '79, M.D. '83) is a pediatrician in Jacksonville, Fla.

Michael Willens (B.S. Ecology, Ethology and Evolution '76, B.S. Pharmacy '80) is a chief pharmacist for Walgreen's in the Chicago area.

Byron K. Wolffing (M.S. Microbiology '78, M.D.) is a senior staff physician at Henry Ford Hospital in Michigan.

Alan Zucker (B.S. Microbiology '74, M.D. '78) has a private practice in obstetrics and gynecology in Melrose Park and Lombard, Ill.

Janet Richert Zvolanek (B.S. Biology '70, M.S. Zoology '72, M.D. '76) is the associate director of ambulatory pediatrics at Lutheran General Hospital in Chicago.

Lori A. Roscetti (B.S. Biology '85) was killed on October 18, 1986 in Chicago, where she was a student at Rush Medical College. Investigations into her death have resulted recently in several arrests.

S. Charles Kendeigh



S. Charles Kendeigh, 1904-1986

S. Charles Kendeigh, ornithologist, teacher, ecologist, and conservationist, died on November 13, 1986.

Kendeigh was on the University of Illinois faculty from 1936 to 1974, becoming professor emeritus in that year.

Kendeigh came first to the Urbana-Champaign campus in the 1920s as a doctoral student. A native of Ohio, he had earned his bachelor's and master's degrees from Oberlin College. While at Illinois he studied with Victor Shelford, the pioneer animal ecologist. (The Vivarium now bears Shelford's name.) After receiving his degree in 1930, Kendeigh spent six years at Western Reserve University, and then returned to Illinois.

Much of Kendeigh's work focused on the theme of vertebrate physiological ecology. *Physiology of the Temperature of Birds*, which he wrote in 1932, is now a classic.

In addition to his scientific work, Kendeigh had a profound influence as a teacher. He supervised the work of fifty-one doctoral students and sixty-five masters students. Among those he taught are Eugene Odum,

now director of the Institute of Ecology at the University of Georgia and the late Robert Whittaker of Cornell University. His textbook *Ecology* has influenced generations of students.

Lowell Getz, professor of ecology, ethology, and evolution, studied with Kendeigh at the University of Illinois, and organized a retirement celebration for him in 1973.

Getz says, "He was so business-like in the field, so organized. Any field trip he led covered lots of ground." Thinking about the ways Kendeigh influenced him to become an ecologist, he says, "He was inspiring, not because he was dramatic, but because he was precise and meticulous."

Kendeigh worked for habitat preservation and wildlife management through national, state, and local organizations. He was a founder and chairman of the Ecologist's Union, now called The Nature Conservancy.

le also served as the first chairman of the Illinois Nature Preserves Commission, and helped found theampaign County Audubon Society. During his retirement years, he became a member of the Citizens Advisory Committee to the Urbana Park District, where he took a special interest in a UPD prairie restoration project.

Updates from Alumni

Donald C. Goodman (B.S. 1949, M.S. in Zoology 1950, Ph.D. in Zoology 1954) is Provost of the State University of New York Health Science Center at Syracuse. He is also Dean of the College of Health Related Professions at the Health Science Center.

Jerrold H. Zar (Ph.D. in Zoology 1967) is Associate Provost for Graduate Studies and Research and Dean of the Graduate School, Northern Illinois University at DeKalb, Ill.

Norman C. Ellstrand (B.S. Honors Biology, 1974; Ph.D. 1980 [University of Texas]) has recently been promoted to Associate Professor in the Department of Botany and Plant Sciences at the University of California, Riverside. Ellstrand's research has taken two paths. His contributions in plant evolutionary biology were the subject of a recent feature article

in the *Los Angeles Times Magazine*. His other line of research on the cherimoya, a tropical fruit, was recognized by the California Rare Fruit Growers who recently awarded him "Researcher of the Year".

Correction

The information that appeared about Holly D. Abrams in the Fall 1986 issue was incorrect. It should have read as follows:

Holly D. Abrams (B.S. '69) earned her Ph.D. in microbiology at the University of Connecticut and was a postdoctoral fellow at the Hutchinson Cancer Research Center in Seattle. She now is a research scientist in viral diagnostics at Bio-Rad Laboratories in California.

The editor sincerely regrets the error.

Let Us Hear From You

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Has another publication done a story on you? If so, please send a copy to the SOLS Alumni Newsletter.

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Teaching in the Tropics

"We're up every morning at five, so that the field data can be collected before the afternoon rains. The data are analyzed, and field problem reports are given in late afternoon. After dinner there are one or two lectures, then planning for the next day until about ten o'clock."

This is the daily schedule for the twenty-two students participating in Organization for Tropical Studies (OTS) summer course in Costa Rica, which Dr. Carol Augspurger coordinated in 1986. Augspurger, a member of the plant biology faculty, is a tropical ecologist whose introduction to tropical habitats came during an OTS course taken while she was a graduate student at the University of Michigan. Her own doctoral research grew out of a problem she began during her OTS course. She currently does research in Panama on Barro Colorado Island, a nature reserve operated by the Smithsonian Tropical Research Institute.

OTS began in the early 1960s as a loose network of ecologists who realized that very few people were studying tropical habitats. The problems of knowing where to go, how to formulate a research proposal, and how to get funding for very unfamiliar areas had kept research stalled. OTS was formed as an educational effort to familiarize North American graduate students and faculty with tropical habitats and orga-



Carol Augspurger, associate professor of plant biology, points out Organization for Tropical Studies field sites

nisms. It is now organized as a consortium of both North American and Latin American colleges and universities.

Over the past twenty-five years, OTS has expanded its educational program, offering courses in English to North American students, courses in Spanish to Latin American students, and a new course in agroecology for conservation biologists, planners, geographers, and agriculture specialists. Under the leadership of Dr. Peter Raven of the Missouri Botanical Gardens it has also become involved in habitat preservation in Costa Rica.

Augspurger believes that the strength of the OTS program lies in its approach to field studies. During the eight week course, students and faculty travel by bus, stopping to work at about ten study sites, which represent a range of tropical habitats, including wet and dry forests, montane and cloud forests, mangroves, and tidal pools. At each study site, students get an introduction to a field problem from one of the faculty. After an ecological question has been posed and a hypothesis developed, students then devise a method for testing the hypothesis.

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collect data in the field, analyze it and give a report. As the course progresses, students spend more time working on individual research projects that may lead to further research and publications.

Augsburger says with conviction, "I'm a firm believer in this course and this approach." Her conviction is borne out, first, by the large number of North American ecologists now studying tropical habitats. Second, the field problem approach has found its way north and into American field programs such as those at Lake Itasca (University of Minnesota Forestry and Biological Station) and the University of Virginia's Mountain Lake Field Station.

Another hallmark of an OTS course is its diversity, both of students and faculty. For the summer course she coordinated, Augspurger chose twenty-two students from seventeen North American universities; five of the students were Latin Americans studying in the United States. Her teaching assistant was a Costa Rican. The faculty she invited to participate represented a range of ecological approaches, including theoretical, evolutionary, and physiological. Because students take this course early in their graduate careers, before they are firmly decided on either their organismal group or their scientific approach, the OTS course gives them the chance to have contact with many different interests and points of view.

Inevitably, the program reflects the political situation of Central America. When the students first arrive in San José, they participate in orientation sessions given by Costa Rican scholars on the climate, geography, history and politics of the region. The local press also talks with the group. In traveling from site to site, they pass refugee camps, and two of the OTS study sites are within an hour's drive of the Nicaraguan border.

In response to the interviewer's question, Augspurger ponders her feelings about studying a habitat that is disappearing at such a rapid

rate. She says, "Since most research is done in preserved areas, we tropical ecologists can sometimes exclude that reality from our consciousness."

"But," she continues, "my conscience is pricked by my interactions with third world scientists. At a recent international meeting in Malaysia I found myself frustrated at how little we could tell them *now* that would help them manage and maintain their forests. I wonder if I should be doing more applied work, or at least more actively showing the implications of my research for applied areas."

Admitting that life as a "commuting tropical ecologist" can have its rough spots ("I feel as though I'm always getting my house ready for someone else to live in"), Augspurger says, "The ecology of tropical organisms is fascinating, and you meet so many people — that's what's so wonderful about it. And it's interesting to me to be submerged in another culture."

Updates from Alumni

Dr. William (Bill) Keppler is currently the Vice Chancellor for Academic Affairs at the University of Alaska, Anchorage. He graduated from the University of Illinois in 1961 with an MS degree and in 1965 with a Ph.D. in genetics. In addition to being the Vice Chancellor for Academic Affairs, Bill Keppler is active in the Pacific Northwest Regional Genetics Group on a maternal health grant awarded to the University of Oregon Health Sciences Center. Dr. Keppler is a member of the Education Committee covering the four states of Alaska, Idaho, Oregon and Washington. He is making presentations on Designer Genes for the March of Dimes and the Pacific Northwest Regional Genetics Group in Alaska.



Last April, graduates of Biology Honors gathered to celebrate 25 years of smaller classes, longer labs, and more physics. David Nanney (left), professor of ecology, ethology, and evolution, reminisces with Sandra Sherwin, '65, and Richard Coppoletti, M.D., '67.

Of Apples (and Apple Maggot Flies)

A small fly is leading Stewart Berlocher's research in several different directions. Or is Berlocher being economical, and using just one fly to study several of his interests concurrently?

The apple maggot fly (*Rhagoletis pomonella*) first got Berlocher's attention at the University of Texas at Austin during his graduate school years in the seventies.

Rhagoletis species are members of the tephritid family of flies, all of which feed on plants, either by making galls, or by feeding inside the leaves or living fruit. The apple maggot fly originally occurred on hawthornes, but about 120 years ago appeared on apples in Connecticut. This phenomenon, in which a new population appears on a domesticated plant in historic time, is known as host race formation.

Berlocher's work has attempted to determine whether or not there are genetic differences between flies found on hawthornes and those found on apples. Gel electrophoresis techniques revealed that indeed there are allele frequency differences between flies that appear on hawthorne and those that appear on apple, a probable indication of genetic divergence between the two host races. (Similar data has come from another study in Michigan; Berlocher is feeling pretty confident that what he sees on the gels represents true genetic differences between the host races.)

What will more work at the molecular level yield? Berlocher hopes to get closer to the genes that are causing the electrophoretically observed differences. He thinks it likely that such genes might control timing of emergence, as well as the response of the flies to visual and chemical aspects of the host fruits.

And then Berlocher, in his relaxed fashion, reconsiders. "Of course, no



Stewart Berlocher, associate professor of entomology

one knows whether when flies come out is genetically controlled or not — the environment is very important." He is currently running an experiment in a controlled environment to look at the question of genes vs. environment with respect to timing of emergence.

Berlocher's controlled environment is a pleasantly cool growth chamber, perfumed by slowly decaying apples, each apple with its resident pair of apple maggot flies. Here, where photoperiod and temperature — environmental factors that could affect timing of emergence — are constant, he collects data on emergence dates. The progeny of these flies will be reared in the same controlled environment, and later will be the objects of electrophoretic scrutiny. The timing data will be compared with the genetic data from the gel electrophoresis, to see whether or not genes controlling emergence are linked to the genetic differences, implying that there usually are two host races. But, Berlocher says, figuring out that there is a genetic race is a long way from figuring out how all the genes involved actually work.

Berlocher describes two important aspects to understanding host races.

First, an understanding of how insects colonize new host plants can help farmers plan control programs. For example, the Colorado potato beetle was first observed in the Southwest on silverleaf nightshade, but now is a serious pest on major food crops such as potato in many parts of the United States. It is likely that genetic changes have allowed this insect to shift to new host plants. Second, insects such as apple maggot flies offer an opportunity to watch a micro-evolutionary process that may potentially lead to reproductive isolation, and hence, to formation of a new species.

And evolution has always had a hold on Stewart Berlocher. He wonders whether there is a psychological basis for his interest. "Evolution was a forbidden subject in Texas when I was growing up, and I've always been slightly rebellious." It is probably no accident that his thesis adviser at Texas was Guy Bush, an evolutionary biologist. In the 1960s, Berlocher says, Guy Bush was "a voice in the wilderness," with his espousal of sympatric speciation, this at a time when allopatric speciation was thought to be all there was. Bush was sometimes criticized for "going out on a limb," Berlocher recalls, but current work by Bush and several coworkers at Michigan State seems to be confirming the possibility of sympatric speciation.

His other interests include geographic colonization — "real colonization," as he says. He and a student studied the movement of apple maggot flies into Oregon and Washington. He is also involved in studies of co-speciation, a situation in which related species of insects feed on related species of plants. He is currently studying the common ragweed, giant ragweed, and cocklebur, and their specialized tephritid flies to determine if these organisms speciated together, and therefore have comparable phylogenies, or whether the insects simply jumped to unrelated plants during their evolutionary histories.

Alumni News

The response from graduates to our request for news has been large and gratifying. We are making an effort to catch up with many responses sent in the past two years; hence, the large number of entries in this issue. SOLS alumni graduate and are promoted at a rapid rate. If the information printed here is out of date, please write again, and we will print revisions in the next issue.

1931

Theodore M. Sperry (M.S. Botany '31, Ph.D. '33) is currently the curator of the Herbarium at Pittsburgh State University, Pittsburgh, Kan. In past years he served as president of The Kansas Ornithological Society and the Kansas Academy of Science. Between 1936 and 1941, he established the Curtis Prairie at the University of Wisconsin-Madison Arboretum.

1934

J. W. Galbreath (M.S. Zoology '34) is retired at Centralia, Ill. after a career in teaching, ecology, and conservation.

1936

C. Leplie Kanatzar (M.S. Zoology '36, Ph.D. '40) is retired after 28 years at MacMurray College, Jacksonville, Ill. At the time of his retirement, he was Dean of the College.

1939

Ralph D. Lowell (M.S. Zoology '39, Ph.D. '43) also earned a B.D. at Asbury Seminary, and taught in the biology department at North Park College and Theological Seminary. He is recovering from neurological damage suffered during a scuba diving expedition.

1940

W. Harold Kessebring (M.S. Botany '40) is retired and enjoying volunteer projects at Middletown, Ohio.

1943

Emily Slapak Kvavli (B.S. '43, M.S. '47) is retired from her position as biology teacher and chairman of the science department at Proviso East High School, La Grange, Ill.

1946

J. Murray Speirs (Ph.D. '46) is retired from the zoology department of the University of Toronto. He is the author of the recent *Birds of Ontario*.

1950

Grover J. Norwood (M.S. Biology '50) is retired from biology teaching at Granite City (Ill.) Senior High School.

1951

Charles E. Butterfield (B.S. Biology/Psychology '51, M.S. Biology/Science Education '53) recently retired as science supervisor for the Ramsey, New Jersey public schools. He also taught in Illinois and was a science editor for several publishing houses.

1956

Norman Duncan Martin (B.A., M.A., L.Th., Ph.D. Ecology '56) is a research biologist and Anglican priest in Ontario, Canada.

Isabel McNaught Garrett Windsor (M.S. '56, Ph.D. Plant Biology '72) is in the department of virology at the University of Natal, Rep. of South Africa. She also runs a regional virus diagnostic laboratory for the province of Natal.

1957

C. Philip McCabe (B.S. Biology '57, M.S. Botany '58) took an early retirement from Eastman Kodak to seek business opportunities.

1959

Micheline H. (Neyrinck) Carr (M.S. Physiology '59) is professor of biology at Los Angeles Valley College. She teaches anatomy and physiology.

1960

Richard Melinder (B.S. '60, M.S. '60) is the dean of university transfer programs at Belleville Area College, Ill.

1961

James D. Lazell (M.S. '61, M.A. '65, Ph.D. '70) is president of The Conservation Agency, a scientific non-profit corporation for exploration and research about endangered and little-known animals world-wide.

1962

Linda Habas Mantel (M.S. Physiology '62, Ph.D. '65) is professor of biology and assistant provost for research and graduate studies, City College of New York.

1964

Richard H. Zeschke (B.S. '64, M.D., Ph.D. '70) is a managing partner of All Care Medical Group in Phoenix, Ariz.

1965

Peter E. Meyer (M.S. '65) is a biologist with the Indiana Department of Natural Resources and manager of the Pigeon River Fish and Wildlife Area.

1967

James R. Karr (M.S. Zoology '67, Ph.D. '70) is an administrator and researcher with the Smithsonian Tropical Research Institute in Balboa, Republic of Panama.

1968

Norman Rose (B.S. Zoology and Chemistry '68, M.S. '71) is a sanitary chemist with the Metropolitan Sanitary District of Greater Chicago. He is also past president of the Lake Michigan Water Analysts.

1969

Lynne Bartenstein (B.S. Microbiology '69) has worked at the Harvard School of Public Health and was a research associate at Oregon Health Science University. She is currently at home with a young son and daughter.

Linda Birnbaum (M.S. Microbiology '69, Ph.D. '72) is a research microbiologist and toxicologist at the National Institute of Environmental Health Sciences, Research Triangle Park, N.C.

Gust Rouhas (B.S. Microbiology '69) is the western director of quality assurance and food safety for the Marriott Corporation.

1970

Diane Martindale (B.S. Biology '70, M.S.) is director of engineering services in research and development for American Pharmaseal.

Penelope Fleming Laughnan Avcin (B.S. Paleobotany '70, M.S. '72, M.S. Information Science '73) is a reference librarian for the Army Material Command — Armament Research and Development Command in Pennsylvania.

Sara Joan Miles (M.S. Biology '70) is assistant professor of biology at Wheaton College, Wheaton, Ill.

Thomas G. Smith (B.S. Biology '70) is Director of Environmental Health with the Livingston County Public Health Department in Pontiac, Ill.

Lori Ube (M.S. Biology '70, M.S. Earth Science '75) teaches biology, earth science, and chemistry at Roxana High School. She is also co-owner of Taralane Angus Farms and lives in Edwardsville, Ill.

Betty Kirk Ishida (Ph.D. Cell Biology '70) is a research biologist with the plant tissue culture project of the Western Regional Research Center, USDA, at Albany, Calif.

Robert E. Wrigley (Ph.D. Zoology '70) is the director and curator of mammals and birds at the Manitoba Museum of Man and Nature at Winnipeg.

1971

Roger C. Reason (B.S. Zoology '71, M.S. '73) is an animal keeper and does animal behavior research at the Chicago Zoological Society, Brookfield, Ill.

1972

John Clay Bruner (B.S. Zoology '72, M.S. Geology) is a doctoral student in zoology at the University of Alberta at Edmonton.

Sharon Meachum (B.S. Biology '72) is a research specialist in pharmacology at the University of Illinois College of Veterinary Medicine.

JoAnn Riecke (M.S. Zoology '72, M.S. Forest Resources) is a naturalist at Discovery Park in Seattle.

1973

Gregory D. Wilkie (B.S. Zoology '73, M.S. Education '80, Certificate of Advanced Degree Studies '84) is the manager of an occupational skills testing program with the military at Stuttgart, West Germany. He was recently included in *Who's Who Among Human Services Professionals*.

John J. Kasper (B.S. Biology '73, M.Sc. Toxicology) is the manager of product safety for Nalco Chemical Company, Naperville, Ill.

Mary Ann Walter (B.S. Microbiology '73, M.S. '74, Ph.D. '84) is a post-doctoral fellow doing collagen research at Shriner's Hospital for Crippled Children, Portland, Ore.

1974

Patricia Godfrey Pazero (B.S. Microbiology '74, B.S. Accountancy, C.P.A.) is a tax manager with Ernst and Whinney in Houston. She specializes in services to nonprofit organizations, including health care facilities.

William H. Allen (B.S. Biology and Rhetoric, '74, M.A. History) is the senior science editor for the University of Illinois News Bureau; he is also a lecturer in the Journalism Department.

Charles Kramer (B.S. Biology '74, M.S. '75, M.S.W. '76) is a psychotherapist at Ann Arbor, Mich.

Barbara Larrain (B.S. Microbiology '74) is a senior research assistant at the Oregon Health Sciences University where she works with autoimmune diseases.

Timothy White (B.S. Botany '74, M.S. Forestry) is working on his doctorate in forestry at North Carolina State University. He was previously associate forester at the University of Illinois Forestry Department.

Donald Macchia (M.S. Physiology '74, Ph.D. '77) is associate professor of pharmacology and toxicology and of physiology and biophysics, Indiana University School of Medicine. He is also studying law at Loyola University at Chicago.

Blaine Severin (B.S. Biology '74, M.S. Environmental and Civil Engineering '75, Ph.D. '82) is a senior environmental process engineer for Tennessee Eastman Company.

1975

Edward J. Basgall (B.S. Microbiology '75, Ph.D. '83) is director of the University of Illinois veterinary medicine electron microscopy facility.

Deborah Brown DiPietro (B.S. Zoology '75) teaches pre-school nature classes at the Urbana Park District and science enrichment classes for the Urbana schools.

Mary J. R. Gilchrist (Ph.D. Microbiology '75) is the director of clinical microbiology at Children's Hospital Medical Center at Cincinnati.

Khien K. Liem (Ph.D. Entomology '75) is a medical entomologist at the Vector Control Laboratory in the Chicago area, where he does research on the bionomics of mosquitoes and their control.

Jan Schweitzer (B.S. Zoology and Psychology '75) is the director of Glen Oak Zoo, a facility of the Peoria, Ill. Park District.

Stephen Sky-Peck (B.S. Biology '75, M.S. Marine Biology '79) is an environmental program specialist in the Hazardous Waste Permit Section of the Louisiana Department of Environmental Quality.

1976

Gary J. Maday (B.S. Biology Honors '76, M.D. '80) is a pathologist at a hospital in Brookfield, Wis. and a medical center at Milwaukee.

D. Keith Crotz (B.S. Botany '76, M.S. '78) owns The American Botanist booksellers, which specializes in out-of-print botanical books, especially pre-1850 American herbals.

K. Michael Orstead (B.S. Biology '76, M.S. '78, Ph.D. Anatomy) is assistant professor in the departments of anatomy and cell biology at Eastern Virginia Medical School.

Porter P. Lowry II (B.S. Plant Biology '76, M.S. '80, Ph.D. '86) is assistant curator and coordinator of the Madagascar Research Program for the Missouri Botanical Garden. He is also research associate with the National Museum of Natural History, Paris, France.

Leslie (Rosencranz) Herzog (B.S. Zoology '76, M.Ed. '81) is a doctoral student in education at the University of Illinois at Chicago.

Stuart Shapiro (M.S. Microbiology '76, Ph.D.) is a researcher at Centre de Bacteriologie, Institut Armand - Frappier, Laval, Quebec.

David Fletcher (B.S. Biology '76, M.D., M.P.H.) is the director of Medwork, a comprehensive occupational health service in Decatur, Ill.

1977

Deborah Freeling (B.S. Biology '77, M.D.) recently finished a residency at Massachusetts Eye and Ear Infirmary in Boston and is now in practice at Kaiser Foundation Hospital, Santa Clara, Calif.

John Paietta (M.S. '77 Biology, Ph.D. Genetics '82) is assistant professor in the Department of Biological Chemistry, Wright State University, Dayton, Ohio.

John Szarek (B.S. Biology '77, B.S. Pharmacy '80, Ph.D. '84) is assistant professor in the Department of Pharmacology, Marshall University School of Medicine at Huntington, WV.

Robert Boyd (B.S. Physiology '77, M.S. '80, Ph.D. '86) is a postdoctoral fellow in the Department of Biology, University of California at San Diego.

James Cali (B.S. Biology '77, B. Theology '83) is a technician in the laboratory of Michael Brown and Joseph Goldstein, the 1985 Nobel Prize winners in medicine at the University of Texas Health Science Center at Dallas.

Jim Hanekanip (B.S. Biology Honors '77) does artificial intelligence and expert system research for Kraft, Inc. at Glenview, Ill.

1978

Suzanne Fisher (Ph.D. Cell Biology '78) is a health sciences administrator in the Grants Review Branch of the National Cancer Institute, NIH.

Elaine Brightly (Ph.D. Ecology) was an assistant professor at Amherst College and the University of Connecticut; she is presently at home with a young child.

Carol Coopersmith (B.S. Ecology, Ethology, and Evolution '78, M.S. '83) is a graduate student at the Institute of Animal Behavior, Rutgers University at Newark, N.J.

Kathleen O'Rourke Johnson (B.S. Biology '78, M.S. Speech and Hearing Science) is a speech and language therapist working with handicapped pre-schoolers.

Rosalie Langelan (M.S. Genetics and Development '78, Ph.D. '85) does postdoctoral research on the genetics of growth control in *Drosophila* at the University of California, Irvine.

Barbara Walton (Ph.D. Entomology '78) is an environmental toxicologist at Oak Ridge National Laboratory in Tennessee.

Annual Fund Supports SOLS

You may get a call this fall from a student from the College of Liberal Arts and Sciences asking you to consider making a contribution to the LAS Annual Development Fund. Last year alumni contributed \$456,000 to the Fund, money that was used to support faculty and student research, scholarships, the Natural History Museum, and many more educational activities.

The School of Life Sciences and its departments have benefitted directly from the Fund, using it to help with faculty recruitment, to provide special awards for students and faculty, and to bring visiting lecturers to campus. When you give to the LAS Annual Development Fund, you may designate your gift to the School or any of its departments. These units have complete discretion over any gifts given to them.

Join the 8,900 other LAS Alumni who have helped make the Annual Development Fund such a valuable asset to the College. Your generosity and theirs can maintain the tradition of excellence in the School of Life Sciences and its departments.

NSF Centers Probe Origins, Mystery of Life

The UI has won a \$400,000 grant to establish one of the National Science Foundation's first Biological Facilities Centers.

The foundation Tuesday announced grants totaling \$10 million to establish its first 20 such centers — including the UI Centers for Prokaryotic Genome Analysis and Molecular Phylogeny. The grants are part of a new federal program to help the United States maintain its lead in biological technology.

The UI will add \$100,000 to the National Science Foundation grant for the study of the structure of genes, ranging from those of the most primitive of bacteria to humans.

"Researchers at the UI centers will probe into the origins of life and study how all living organisms are related to each other and their ancient ancestors," said Jordan Konisky, head of the department of microbiology.

One of the primary goals will be to study and compare genetic sequences found in the cells of all life. These gene sequences are "historical documents," which now can be read by scientists who wish to learn the family history of life on Earth.

The UI center, which is in the university's School of Life Sciences, is composed of two distinct but highly interactive groups, Konisky said.

The Prokaryotic Genome Analysis Center, co-directed by Konisky and Carl R. Woese, will draw its researchers from molecular biology, microbiology, computer sciences and engineering. They will explore the molecular biology and physiology of bacteria, especially the group of primitive organisms called archaeobacteria.

Archaeobacteria were first recognized as belonging to a new kingdom of life in the 1970s by Woese, a UI professor of microbiology. Archaeobacteria are believed to be more closely related than other kingdoms to the ancestral organism from which all existing life is descended.

This research group, Konisky said, has received an additional \$157,000 grant from the U.S. Department of Energy's University Instrumentation Program. The grant will allow acquisition of additional advanced equipment for large-scale sequencing of archaeobacterial genes. The center also is close to establishing cooperative research programs with industrial partners, Konisky said.

The other UI group, the Center for Molecular Phylogeny, will study the evolutionary biology of higher life forms, as well as the lower ones being examined by its sister group. It will use much of the same equipment and technology to seek genetic

Continued on page 8

Let Us Hear From You

Return to:

SOLS Alumni Newsletter
390 Morrill Hall
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Name_____

Address_____

State and Zip Code_____

U. of I. degree(s) and year(s)_____ Dept. or Program_____

Additional degree(s)_____

From where?_____

Current Activity/Employment_____

Has another publication done a story on you? If so, please send a copy to the SOLS Alumni Newsletter.



clues to better understand how all living things are related to one other and to their evolutionary ancestors.

The molecular phylogeny group has been in existence for about a year, said Thomas Uzzell, the center's director, director of the UI Museum of Natural History, and a professor of ecology, ethology and evolution.

The group includes specialists from geology, entomology, microbiology, plant biology and other disciplines.

As with its sister group, this is in keeping with the stated purpose of the biological centers program, which the National Science Foundation said "was established in 1986 to

encourage researchers from diverse biological disciplines to share state-of-the-art equipment and to work together to solve complex problems requiring insights from different scientific perspectives."

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1988 FALL

SOLS

School of Life Sciences
Alumni Newsletter

Fall 1988

Welcome Cell and Structural Biology

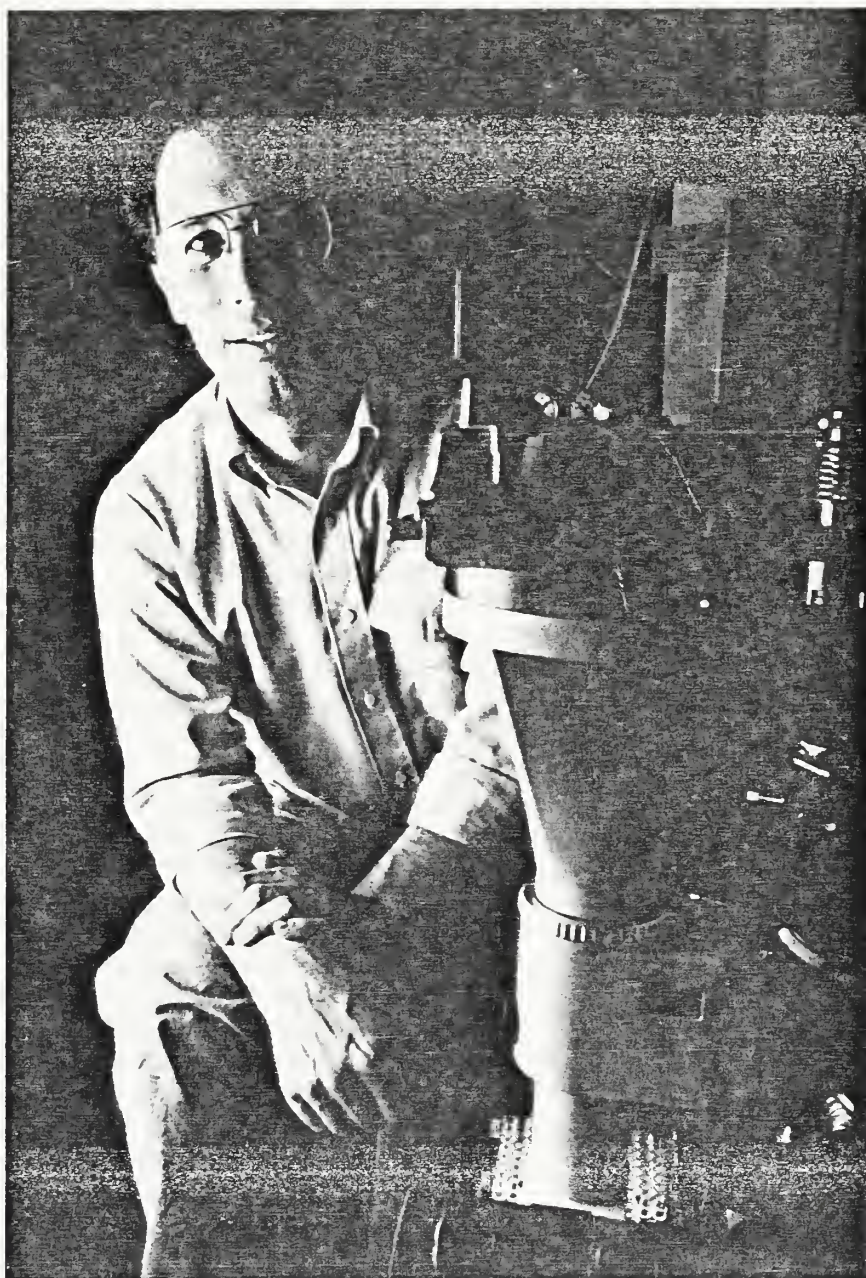
"We're small, we're energetic, and we're in a big growth phase." This is how Rick Horwitz describes the new department of cell and structural biology (formerly the anatomy department) of which he is the new head.

Horwitz says the focus of the department will be eukaryotic molecular cell biology. Faculty researchers will be investigating such topics as regulation of gene expression, structure of genes, and mechanisms of mitosis, cell motility, and hormone action. There are also research efforts in the areas of development and neuro-development. Horwitz sums it up: "We want to provide molecular explanations of what the cell is and how it works."

The faculty of the new department has been joined by several faculty members of the now dissolved department of genetics and development.

They will be joined this academic year by two new faculty recruits. Andrew Belmont, who is currently at the University of California, San Francisco, has developed methods of looking directly at the structure of chromosomes using electron microscopy and other image enhancements. Ronald Blackman, presently at Harvard, is working on a *Drosophila* gene that is involved in the process of pattern formation during several stages of development.

Horwitz' own research focuses on integrin, a molecule that acts as a receptor for extra-cellular matrix molecules. Integrin is involved in a



James Corley

Alan F. "Rick" Horwitz, head, department of cell and structural biology

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very large number of processes: adhesive interactions, holding muscles to tendons; stabilizing neuro-muscular junctions; platelet aggregation; complement fixation; and more. It is also a member of a large family of molecules that appear to help cells get to their destinations during development.

Recently it was discovered that integrin acts as a target for a certain class of oncogenes, which may explain in part some characteristics of tumors — the fact that the cells don't stick together well, and that the cells round up into a spherical shape.

In only three years Horwitz has seen knowledge of integrin affect all the major fields of biology. He smiles ruefully as he remembers the days when he and colleagues would say to each other, "What about this? It could be doing that." Says Horwitz, "Now we don't talk. Now we just work."

An important departmental undertaking is the development of a year long laboratory course for undergraduates emphasizing cell and molecular biology. Horwitz feels that with exposure to cell culture, northern and western blots, and cloning, students would be prepared to move into laboratory positions in pharmaceutical and biotechnology companies. He says, "We're planning for one spectacular course, with heavy faculty involvement in teaching the labs."

Long Distance Degree

When Sandra Swope Ishikawa left the University of Illinois in 1964 to take up residence in Japan, she was a zoology major, many hours short of graduation. Now she is a teacher of English in Osaka, the proud holder of a bachelor's degree in biology, acquired through correspondence courses, at the University of Illinois and elsewhere.

In addition she is on her way to completing a master's degree in Teaching of English to Speakers of Other Languages through the Osaka campus of Temple University.

Beginning in 1985 the correspondence began between Ishikawa, the College of Liberal Arts and Sciences, and Helen Hess, Assistant Director of the School of Life Sciences. Ishikawa wrote at that time, "Of course, in the years since I attended the university, there have been many changes — including dropping zoology."

The College sorted out the residency problems, Helen Hess gave guidance on graduation requirements, and Ishikawa became an expert on correspondence courses in biology.

The University of Minnesota supplied ecology, and the University of California offered genetics. In February 1987 Ishikawa wrote, "I have just received notice that I passed (thank heaven) Math 120."

An evolution course from Kentucky and physiology from Kansas completed her biology requirements, and Ishikawa was added to the May 1988 graduation list, 27 years after entering Illinois as a freshman.

By that time, she had begun taking courses for her master's, and in July she wrote, "I am being encouraged to go for a doctorate after I get the master's degree, so the next thing I have to do is find a way."

She surely will.

Award Honors Animal Behaviorist

The first award from the Edwin M. Banks Memorial Fund was made during the summer of 1988 to Karen Tyrell, a doctoral student in the department of ecology, ethology, and evolution.

Ed Banks, who died in 1985, spent much of his professional life studying social behavior in a variety of vertebrates. He was particularly interested in parent-offspring relationships and in dominance as an aspect of social organization.

Banks served as the first head of the department of ecology, ethology, and evolution, when it was still a provisional unit, following the dissolution of the zoology department. He was also a founding member and president of the Animal Behavior Society. He is credited with helping to develop an understanding of animal behavior that included perspectives from evolution.

Banks carried out much of his field work in the Alaskan and Canadian tundra. There he studied lemmings, gathering baseline data on their behavior and social structure.

The purpose of the memorial fund is to help fund the research of an outstanding student of animal behavior. Through the generosity of family and friends, students and colleagues, the fund is approaching its goal of \$10,000. Gifts may be made to the Banks Memorial Fund, in care of the University of Illinois Foundation, 224 Illini Union, 1401 W. Green, Urbana, 61801.

Bats: Hearing Specialists

are her bats "hideous creatures of the night," as many old natural history books suggest? Karen Tyrell, graduate student in the department of ecology, ethology, and evolution, thinks not. She finds her small colony of *Megaderma spasma* (Malayan false vampire bats) to be clean, curious, responsive, and very intelligent. You could teach these guys to play basketball," she jokes.

Tyrell is the first recipient of the Edwin Banks Memorial award, which supports graduate research in animal behavior.

Tyrell is studying the way in which bats use their auditory system to locate prey. Whereas most of the world's 900 species of bats feed exclusively on flying insects, which they find using biological sonar, or echolocation," *M. spasma*, belongs to the smaller group of "surface gleaning" bats. These animals may face difficulties using echolocation to spot prey on the ground, as any echoes returned from the prey may be lost in the clutter of echoes coming back from the larger surface of the ground itself.

Tyrell's research has shown that *M. spasma* forages for terrestrial insects by waiting on a nearby perch and listening with incredibly sensitive ears for the minute sounds that insects make as they crawl. The bat then uses its echolocation apparatus to navigate its way to the prey, avoiding branches, walls, and other hazards. Echolocation is also used to determine the distance to the prey. In addition to surface gleaning, these bats find flying insect meals using echolocation.

This differential use of auditory abilities in alternative foraging situations raises questions for Tyrell: How does the animal decide to use one mode or the other? What are the limiting factors in the bat's various auditory abilities? What is the effect of the abundance of either crawling or flying insects?



Karen Tyrell hand feeds bats

James Corley

In order to address how the bat's auditory behavior functions in a natural setting, Tyrell spent the summer in North Carolina doing field studies of another species of surface gleaners, work made possible by the Banks award.

Tyrell came to Illinois from the University of Wisconsin, where she studied the social behavior of primates. She and Professor Banks had "met" via a computer system, and she came here to work with him on his research on auditory communica-

tion in voles. It was while doing that research that she became interested in questions about the relationship between the development of hearing and behavior. These questions were not easily studied in voles, leading her to look for a more suitable study subject. She decided to work with bats, an animal with a very specialized auditory system and hearing-related behavior.

Alumni News

1945

William F. Rapp (M.S.) has retired after 30 years as a medical entomologist with the Nebraska State Department of Health. He and his wife Janet I. C. Rapp (M.S., Ph.D. '48) are now doing research on spiders, isopods, and pseudoscorpions. She has retired from a position as Field Director, Girl Scouts of America.

1956

Mary E. (Mangaoang) Harris (B.S., M.S. '57) has retired from teaching, and is now involved in a variety of community activities in Mariposa, Calif.

1959

Elaine G. Rosen (B.S. Zoology, M.S. '63) is associate professor of biology at Harry S. Truman College, City Colleges of Chicago.

1964

Paula Brockstein Adams (B.S. Biology, M.S. '65) is a high school biology and marine science teacher in Houston, Tex.

David L. Thomas (B.S. Zoology, M.S. Ecology '67, Ph.D.) is director of the Hazardous Waste Research and Information Center, an office of the Illinois Department of Energy and Natural Resources.

1966

Peter Skaller (M.S. '66, Ph.D. Plant Ecology '77) became a priest in The Christian Community, after three years of study in Stuttgart, West Germany. Previously he had worked as an ecologist in the Department of Landscape Architecture and Regional Planning at the University of Pennsylvania. He lives in Toronto.

1967

Sandra J. Durrett (B.S. Microbiology, M.A.T. Biology, C.A.G.S. Staff Development) serves as director of community services at Holyoke Community College, Holyoke, Mass.

Robert H. Gray (Ph.D. Botany) is professor and chairman of the department of environmental and industrial health, University of Michigan, Ann Arbor. He is conducting research on toxicologic pathology.

1968

Susan L. Oates (B.S. Biology) works as a documentation officer in the product assurance office, TIRKS Application Support Center, Cincinnati.

1969

James E. Slouf (B.S. Biology, M.S. Ed. '74) teaches chemistry and is coordinator of the chemistry curriculum at Downers Grove South High School, Downers Grove, Ill.

1970

John T. Allin (Ph.D. Zoology) is employed as a fisheries biologist at the Ministry of Natural Resources, Fisheries Branch, Toronto, Ontario.

1971

Donald G. Buth (B.S. Zoology, A.B. Anthropology '72, M.S. Zoology '74, Ph.D. EEE '78) is associate professor at UCLA, where he teaches ichthyology, systematics, and evolutionary biology.

John C. Ellis (B.S. Honors Biology, M.D. '76) is director of pediatric ambulatory services at Methodist Hospital of Indiana in Indianapolis.

Robert A. Hill (B.S. Biology) works as an environmental scientist for Peabody Coal Company at Carrier Mills, Ill.

1972

John H. Cissick (Ph.D. Physiology) is a colonel in the U. S. Air Force. He is assigned as the deputy director for clinical research at Lackland AFB, Texas, the largest USAF medical center.

1974

Carolyn J. Toren (B.S. Biology, M.B.A.) was promoted last April to manager of product and inventory control for Avon Products, Morton Grove, Ill.

Janet M. (Bethune) Unzicker (B.S. Microbiology, M.T.) teaches biology and other science courses at LaSalle-Peru Christian School, LaSalle, Ill.

1975

Michael R. Landauer (Ph.D. Zoology) works as a civilian research behavioral toxicologist at the Armed Forces Radiobiology Research Institute at Bethesda, Md.

Adrienne L. Rubinkowski (B.S. Biology) is in Naples, Italy with the Sixth Fleet, where her work is involved with antisubmarine warfare. She was recently named an Outstanding Young Woman of 1986.

1976

Howard S. Becker (B.S., M.D. '79) has a private practice in internal medicine in Park Ridge, Ill. He is also medical director of Choice Health Care, and is physician advisor for several area hospitals.

Evan R. Ferguson (Ph.D. Physiology and Biophysics) is director of programs for Sigma Xi, the scientific research society.

Tom Skelly (B.S. Biology, M.S. '79) is a water resources specialist with City Water, Light and Power, the municipal utility of Springfield, Ill. The projects he works on include lake restoration, fisheries management, soil conservation, prairie restoration, and long-term water supply planning.

Mark E. Wilensky (B.S. Biology) is manufacturing manager for Dow B. Hickam Inc., a pharmaceutical manufacturer in Houston.

1977

Debra Jean Goodwin (B.S. EEE) is a Peace Corps volunteer in Paraguay. She works as a specialist in natural sciences and environmental education at the teacher's college in San Juan Bautista.

1979

William R. Burkey (M.S. Physiology, M.D. '83) is the proprietor of Waverly Family Practice Center at Waverly, Ill. and is medical director of the Jacksonville Area Council on Alcoholism.

Keith E. Chew (B.S. Physiology, M.S. Biology '81, M.H.A. '86) is director of business and clinical affairs at Texas Tech University, Health Sciences Center School of Medicine.

Susan Killinger Hoyle (B.S. Physiology '79) has completed a business degree at the University of Maryland.

Randall E. Junge (B.S., M.S. Biology '81, D.V.M. '85) is a resident in zoo animal medicine at the St. Louis Zoo.

Nancy Klehr (B.S. Biology, M.P.H.) is at the University of California School of Medicine, San Francisco, where she is the project coordinator for a workplace health promotion research project.

Thomas R. Komp (B.S. Biology, D.P.M.) is a podiatrist with Bay Area Podiatry, Green Bay, Wis.

Frederick E. Maier (B.S. EEE) is director of Spring Brook Nature Center, Itasca, Ill. He has just completed production of his 100th cable television show on nature.

Michael Melampy (Ph.D. EEE) is assistant professor of biology at Baldwin-Wallace College, Berea, Ohio.

1980

John J. Ciribassi (B.S. Biology '80, D.V.M. '84) is employed with his wife **Elise Stern** (D.V.M. '84) in a veterinary practice in Troy, Pennsylvania where he works primarily with dairy cattle, and she is involved with small animals.

Susan Thomas Flint (B.S. Biology, M.D.) is a chief resident in pediatrics at Rush Presbyterian-St. Luke's Medical Center in Chicago.

Mark Sandheinrich (B.S. EEE, M.S., Ph.D.) has a temporary position as assistant professor in the Department of Animal Ecology at Iowa State University, where he earned his advanced degrees.

Joseph D. Schrag (M.S. Physiology, Ph.D. '84) is a post-doctoral research associate in the biochemistry department at the University of Arizona. He is using cryoelectron microscopy and image processing to study the structure of the Herpes Simplex Type I virus. He is married to **Joan Martin Schrag** (M.S. Physiology '80).

Frances (Wildman) Whitney (B.S. EEE) works as a physical scientist in the Engineering Directorate at the Rock Island Arsenal, Rock Island, Ill.

1981

Susan L. Buss (B.S. Biology, M.P.H.) is director of environmental and occupational health for the Chicago Lung Association.

Gregory Chaljub (B.S. Biology, M.D. '85) is a resident in radiology at University of Texas Medical Branch.

Randall W. Klug (B.S. EEE) is environmental health and safety manager for Penray Company in Wheeling, Ill.

Steven E. Mather (B.S. Physiology, M.D. '85) is a research fellow at Harrington Arthritis Research Center, Maricopa Medical Center in Phoenix. He is currently involved in designing hip replacements and researching the role of interleukins in arthritis.

Mary K. (Poirot) Ritke (M.S., Ph.D. Microbiology '85) is a postdoctoral research fellow in the Department of Virology and Molecular Biology at St. Jude's Research Hospital, Memphis.

Kendra Schroeder (B.S. Microbiology) works in the Cell Biology/Tumor Drug section at the Merrell Dow Pharmaceutical Research Institute, where she analyzes and interprets flow cytometry data.

Elizabeth M. Sharp (B.S. Microbiology) is a medical student in Fort Worth, Texas.

Jacqueline C. Tanaka (Ph.D. Physiology) does research at the Department of Biochemistry, University of Pennsylvania.

1982

Colleen M. Almgren (B.S. Biology, D.V.M. '87) provides large and small animal services at the Brightman Animal Clinic in Clarksville, Ark.

Angelo Anton (B.S. Biology) is a sales representative in the Chicago area for the Argyle Company.

Greg Crabb (B.S. Microbiology, M.A.T.) is a public high school teacher at Durham, N. C.

Dawn M. Dawson (B.S. Microbiology, M.D. '86) is a resident in internal medicine at University of Illinois Hospital, Chicago. Her husband **Mark S. Dawson** (B.S. Physiology '82, M.D. '87) is a resident in pediatrics at Cook County Hospital.

Deborah A. Jackson (B.S. EEE) is a zookeeper in the carnivore department at the Little Rock Zoo, Little Rock, Ark.

Frances M. Miles (B.S. Biology, M.S. '83, M.D. '87) is a pediatric resident at the University of Iowa Hospital and Clinic, Iowa City.

Lyle F. Parks (B.S. Biology, M.D.) is a resident in psychiatry at Southern Illinois University, Springfield, Ill.

Curt Vade Bon Coeur (B.S. EEE) is a technician/ranger with the National Park Service, working in law enforcement and resource management.

1983

Martha Butterfield (B.S. Biology, M.D. '87) is a resident in internal medicine at Vanderbilt University.

William Clanfield (B.S. Biology, M.D. '87) is a resident in internal medicine at the University of Iowa Hospitals and Clinics, Iowa City. He is married to **Kathleen Kiehl Clanfield** (B.S. '82, M.S. '83).

renda R. Fabisch (B.S. Biology '83, M.D.S.) is practicing dentistry in the northwest Chicago area.

Robert A. Feldman (B.S. Biology, M.S. '86) is a research associate in the DNA sequencing facility of California Biotechnology Inc., Mt. View, Calif.

Jeffrey L. Hallett (B.S. Biology, M.D. '87) is a resident in internal medicine at Barnes Hospital, Washington University Medical School, St. Louis, Missouri.

Leslie (M.S. Microbiology '84) and Joel Martin (M.S., Ph.D. '88) are in Pasadena, California, where Joel is a postdoc.

Stephanie E. Nagy (B.S. Biology) graduated in June 1987 from the University of Chicago Pritzker School of Medicine. She is now a resident in internal medicine at the University of Pennsylvania.

Marycarol Tuman Nowicki (B.S. BEE) received a certificate in computer science from DePaul University and is a regional information manager for the Rocky Mountain Heritage Task Force of The Nature Conservancy.

Amir H. Rezvani (B. Sc., M.S.E., M. Sc., Ph.D. Physiology) is research assistant professor and assistant director of Bowles Biomedical Research Laboratory, Center for Alcohol Studies at the University of North Carolina School of Medicine, Chapel Hill, N.C.

John J. Trumbull (B.S. Honors Biology) is a sales representative for Sargent-Welch Scientific Company, a manufacturer and distributor of laboratory equipment. His territory includes the northern third of the Chicago metropolitan area.

1984

Rodney E. Anderson (B.S. Biology) works in the serology section of the Illinois State Police Forensic Science Laboratory.

Howard B. Chodash (B.S. Physiology) is a student at UIC College of Medicine, where he holds leadership positions with the Chicago Medical Society student governing board and the AMA student section.

John V. Dierker (B.S. Biology) is a forensic scientist in the Latent Fingerprint Section of the Bureau of Forensic Sciences, Illinois State Police.

Daniel J. Gales (B.S. Biology, M.A.) is assistant athletic trainer at Lock Haven University, Penn.

Michael E. Horn (Ph.D. Biology) is a research scientist at Plant Genetics, Inc., Davis, Calif.

Rick Lindroth (Ph.D. Ecology) is at the University of Wisconsin-Madison, where he is an assistant professor in entomology.

Mary S. Lohse (B.S. Biology '84, B.S. Physical Therapy) is a physical therapist at the University of Iowa Hospitals and Clinics, Iowa City. She works in the divisions of cardiopulmonary, neurology, and orthopedics.

Terry Riss (Ph.D. Cell Biology) is a postdoctoral research fellow in the Department of Biochemistry and Molecular Biology at the University of Texas Medical School at Houston.

Luke E. Sewall (B.S. Biology, M.D.) is an intern in surgery at Johns Hopkins Hospital in Baltimore. He is married to Holly E. Sewall.

1985

Shari E. Anderson (B.S. Biology) is a student at the University of Minnesota, working on a master's degree in business administration.

Mary Salamon Cialkowski (B.S. Microbiology) is a research technician for the University of Louisville biochemistry department.

Edward J. Green (Ph.D. Neural and Behavioral Biology) is a postdoctoral fellow at the University of Colorado, Boulder.

Paul Gross (Ph.D. Ecology) is a lab manager and postdoctoral fellow at the department of entomology, University of Maryland. He is doing re-

search on plant-insect interactions and the basic biology of biological control agents.

Fanee Lekkas (B.S., M.S. Biology '87) is attending medical school at St. Louis University.

Lina A. Vieraitis (B.S. Microbiology) is employed by Cetus Corporation in California, a biotechnology company working on cancer therapeutic drugs.

Lolita M. Wiggins (B.S. Biology) is a pharmaceutical representative for Smith Kline and French Laboratories in the Champaign-Urbana area.

1986

Joanne M. Borucki (B.S. Biology) works as a research and development technician in the diagnostics division of Abbott Laboratories.

David Brenningmeyer (B.S. Biology) is pursuing a master's degree in zoology at Southern Illinois University at Carbondale, where he is a research assistant with the Cooperative Wildlife Research Laboratory.

Ann M. Clark (M.S. Biology) is pursuing her doctorate at Pennsylvania State University, where she is studying reproductive physiology in the Dairy and Animal Sciences Department.

Darcia A. Merritt (B.S. Biology) is a student at William M. Scholl College of Podiatric Medicine, Chicago.

Lisa M. Peck (B.S. Biology) is a student at Rush Medical College in Chicago.

1987

Lynne P. Nolan (B.S. Teaching of Biology) spent the last year studying cellular physiology at the University of Nice, France, as a Rotary Scholar.

AIDS Not a New Disease

The virus that causes AIDS appears to have been around, undetected, for more than 200 years, a UI geneticist has found.

And the AIDS-related virus resembles more the kinds of viruses that cause such diseases as anemia in horses than those that cause cancer, Shozo Yokoyama has determined.

Yokoyama studies the evolution of the human immunodeficiency virus (HIV), which leads to Acquired Immune Deficiency Syndrome. Knowing how the virus changes is important because HIVs mutate so quickly — about 1 million times faster than normal human genes — that developing an effective vaccine is extremely difficult.

"If you make a vaccine in 1988 and the virus evolves and changes in 1990, that vaccine may no longer be effective," Yokoyama said.

Studies of initially discovered viruses (HIV 1) suggested that they evolved only in the past 20 years. But Yokoyama's recent findings show



Shozo Yokoyama, associate professor of ecology, ethology and evolution

HIV 1 and the recently discovered HIV 2 from human and simian immunodeficiency viruses have a common ancestor going back more than 200 years, the researcher said.

"AIDS is not really a new disease. The implication is that AIDS has existed for a very long time but went undetected," said Yokoyama, a member of the ecology, ethology and evolution department.

Both HIV 1 and HIV 2 destroy the body's immune system and its ability to fight disease, the fatal condition known as AIDS.

A second significant finding — reported by Yokoyama and the UI's Lynn Chung in the journal *Molecular Biology and Evolution* (May) — compares immunodeficiency viruses to other viruses. HIVs genetically resemble lentiviruses — which cause such diseases as anemia in horses, and arthritis in goats and sheep — more than they resemble cancer-producing oncoviruses.

"The common ancestor of the HIV 1 and HIV 2 strains diverged from that of the lentivirus," Yokoyama said. "And the common ancestor of the lentivirus and oncovirus diverged even earlier than that."

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Let Us Hear From You

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Name _____

Address _____

State and Zip Code _____

U. of I. degree(s) and year(s) _____ Dept. or Program _____

Additional degree(s) _____

From where? _____

Current Activity/Employment _____

Has another publication done a story on you? If so, please send a copy to the SOLS Alumni Newsletter.

Gift Supports Molecular Biology Research

Dr. Roy Hong, a retired physician from Wild Rose, Wisconsin, and his wife Eva have established a fund to support molecular biology research.

Dr. Hong, who was born in Canton, China, came to Illinois as a young boy. He attended elementary and high school in Danville, and then completed his undergraduate work at the University of Illinois, graduating in 1937. He continued his education at the University of Illinois School of Medicine at Chicago, served an internship at Cook County Hospital, and then established his practice in rural Wisconsin. Since their retirement in 1980, Dr. and Mrs. Hong have travelled in Europe and Asia. Now they enjoy a "very sensible and leisurely life."

"I am still intensely interested in all phases of science, read all the time, subscribe to all the journals, annual reviews, and try to keep abreast of medical and surgical advances," says Dr. Hong.

Annual Fund Supports SOLS

Alumni are making significant contributions toward the success of the School of Life Sciences as a teaching and research unit.

Each year the College of Liberal Arts and Sciences conducts a telephone campaign, offering alums the opportunity to make a donation.

When you get a call, remember that you may designate the School of Life Sciences, or any of its departments or programs, as the recipient of your gift. Donations received in the past have funded the purchase of new equipment, supported the development of new research projects, enabled graduate students to attend conferences, and provided scholarships for undergraduates.

Your gift can make a difference.

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School of Life Sciences

alumni newsletter

fall 1990

A Summer of Research: Opportunities for the Undergraduate

"I feel much more capable in the lab now...," "Now I'm thinking about an MD/PhD program...," and "I'm definitely, for sure, applying to grad schools..." were just some of the responses to the question "What did you learn from your research experience this summer?"

Eight weeks of 40 or more hours per week in a research laboratory exposed a group of 14 undergraduates to the tedium, repetition, and uncertainty of research—and they loved it!

Naomi Arenson, a student from Oberlin College, said that she used to feel uncertain about her lab skills, but this summer has boosted her confidence. "You get a chance to do things over and correct your mistakes," she said. She has an interest in environmental policy, but her work with Gene Robinson, assistant professor of entomology, on the role of nepotism in the social structure of honeybee colonies has helped her to understand and appreciate the role of basic sciences.

Matt Johnson, a pre-med student at the University of

Illinois, says he is now thinking about doing graduate work in biology, as well as training in medicine. With his advisor Phil Best, associate professor of physiology and biophysics, he worked on a possible relationship

between growth hormones and calcium currents in skeletal muscle.

Betty Prewett has been in SOLS' biology teacher training curriculum. Thinking about the challenges that her research

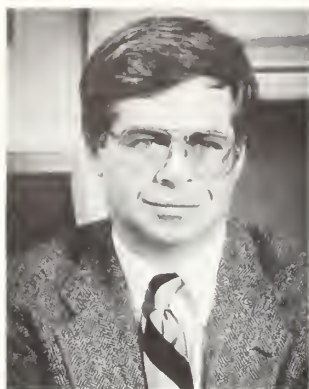


Photo by Jim Corley, B&W Photo

Back: Ven Raman, Matt Johnson, Eric Jensen, Todd Tucker. Center: Stethia Panoushis, Alex Martinez, Laura Smajo, Tim Pritts. Front: Naomi Arenson, Betty Prewett, Frances Hoff, Chuck Benmi. Not present: Jodi Nofsinger, Pat Nolan.

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NOV 21 1991



The Director's Perspective

It is an exciting time to be a biologist. One needs only to scan the newspapers, news magazines, or television to appreciate the advances in life sciences that touch our lives. Bioethics, genetic testing, biotechnology, endangered species, biodiversity, genetic engineering, biological pest control,

patenting of new life forms, and bioremediation are now covered by the press which a few years ago only reported on progress in medicine and agriculture. Biology is now a multi-billion dollar international endeavor that touches every facet of society.

Through research and teaching, the School of Life Sciences participates in activities that place biology before the public almost daily. These advances also impact SOLS as we continue to adjust our programs to reflect the vitality of our discipline.

Opportunities in the job market for biologists are unprecedented. In the past, most of our graduates went on to medical and dental schools, allied health professions, or graduate school.

This is changing. In a recent issue of *Genetic Engineering News* over 500 US companies engaged in biotechnology were listed—many of which reside in the Midwest. As a result, more SOLS majors are entering the job market immediately upon graduation.

However, opportunities go beyond industry. Projections indicate that within the next 10 years colleges and universities will face a severe shortage of faculty, as many current faculty reach retirement age just as college enrollments are expected to increase. Similarly, there will be an increased need for biologists in governmental agencies. Biologists will be needed in commerce, law, marketing, and other areas of the business world.

However, studies show that a shortage of trained workers to fill these jobs is looming unless we can attract talented students in increasing numbers to the life sciences. Further-

more, if a long-term shortage of biologists is to be averted, unprecedented numbers of minorities will have to be attracted to careers in the life sciences.

SOLS is providing students with opportunities to participate in the kinds of activities in which they might be engaged as professional biologists. As a result, students who were attracted to biology through an interest in the health professions are discovering that biology offers many opportunities. Through programs supported by the National Institutes of Health and the National Science Foundation, undergraduates receive financial support to work in research laboratories. As described elsewhere in this newsletter, undergraduates also participate in research programs through stipends provided by a grant from the Howard Hughes Medical Institute.

In another area, Dr. George Kieffer taught a course in Chicago last spring for high school biology teachers that emphasized advances in the biological sciences, especially those in biotechnology. As described elsewhere, our Chicago program is complemented by summer workshops on campus for high school and community college science teachers. These teachers will convey the excitement of what they learned to their students, and as a result, we anticipate more students will seriously consider a career in some area of the biological sciences.

I am confident that individuals wishing to take advantage of the opportunities offered by our discipline will find biology exciting, challenging, and rewarding.—Jordan Konisky

continued from page 1

project presented, she says, "I got to think—to integrate what I had learned in chemistry and biology." And her plans now include graduate school.

A grant from the Howard Hughes Medical Institute provided financial support to these students for the summer. Students were chosen from the University of Illinois and other Midwestern liberal arts colleges. Each awardee then chose a faculty member whose research interested them.

Concern about the next generation of scientists has prompted several funding agencies, including the Howard Hughes Medical Institute, to look carefully at the preparation undergraduates are receiving in science and to provide incentives that will encourage more participation in research.

For many years SOLS has offered undergraduates the opportunity to participate in research projects for academic credit. In fact, any student who wishes to graduate with distinction must do research and write a senior thesis based on that research. The Hughes award makes it possible for some students to spend a summer devoting all their attention to a research project, without having to sacrifice a summer's earnings to do so.

But a summer is not long enough for some to feel they have completed a worthwhile project, so many of this summer's students will be continuing their research into the fall.❖

'Dean of Mammals' Chronicles Natural History of Illinois

by Larry Bernard

Black bear, bison, buffalo, and mountain lion no longer roam the Illinois prairie, but bats, rodents, and coyotes have thrived since Europeans arrived in Illinois.

"Amazingly, all the things man has done to the environment have not seemed to hurt the mammals. In fact, many have profited by the deeds or misdeeds of man," said Donald F. Hoffmeister, the acclaimed 'dean of mammals' of Illinois.

He has spent more than 40 years researching mammals and compiling information for the most complete study of the state's animals ever accomplished: his book, *Mammals of Illinois*, was published in December 1989 by the UI Press. He is also author of *Mammals of Arizona* and *Mammals of the Grand Canyon*.

The 348-page book—with 60 color plates, 192 black-and-white photographs, and 100 anatomical drawings—not only offers narrative descriptions of the state's past

and present mammals, but also details life histories, distributions, ecology, and climate and how these factors affect each species. It provides detailed keys and even DNA information for identification purposes.

"Some people will say, 'So what?'" Hoffmeister said. "But with this, there is a permanent, published record of the distribution up to 1987. In 100 years, people will know exactly where the specimens were found."

Shrews, rabbits, coyotes, eight kinds of bats, opossums, lemmings, and deer are among the characters in Hoffmeister's book. He delves into the past as well, examining the record from the Pleistocene to the present, includ-

ing the mammoth, mastodon, and musk-ox, all extinct.❖

—Courtesy of Illini Week

EDITOR'S NOTE: Dr. Hoffmeister was director of the Museum of Natural History for almost 40 years and is Director Emeritus. The photograph shows him in front of one of the Museum's display cases; much of the material for his book is in its research collection.



Natural History Museum Becomes a LAS Unit

1990 marks an important event in the history of the Museum of Natural History: this summer the Museum became a separate unit of the College of Liberal Arts and Sciences.

Throughout much of its history, and especially after Frank C.

Baker was appointed its Curator in 1917, the Museum has had close ties to zoology. Its strong research collections—amphibians and reptiles, mammals, mollusks—are all zoological, so even though the Museum will move out of the Department of Ecology,

Ethology, & Evolution officially, it will still be affiliated with the School of Life Sciences.

In addition, ties with the departments of Anthropology and Geology will continue to be strengthened.❖

Faculty Briefs

A UPI dispatch focused on research by entomologist **May Berenbaum** and postdoctoral associate **Art Zangerl**. She discussed the difference between most plants' insect-deterrence strategies and those of humans. Plants activate toxins when needed and distribute them based on risk and value of affected parts. That tactic is contrasted by man's regular application of insecticides, whether needed or not, leading to the rapid development of resistance by pests.

Chris Q. Doe, assistant professor of cell and structural biology, recently received a Presidential Young Investigator Award, which carries a \$25,000/year award for 5 years and up to \$37,000 in matching funds that can be spent without restrictions. He also received a Searle Scholar's Award, which is \$60,000/year for 3 years.

John R. Laughnan, professor of Plant Biology, was presented a plaque in December 1989 for his outstanding

contribution to the sweet corn industry by the development of supersweet sweet corn. Dr. Laughnan retired this August after 41 years on the faculty.

Stanley Maloy, associate professor of microbiology, taught a 2-week course on advanced molecular genetics in Chile in September; it was sponsored by the American Society for Microbiology. He will teach a NATO international lecture course "New technologies in molecular biology" in Sevilla, Spain, in February 1991. Dr. Maloy will also be teaching "Bacterial and phage genetics" at Cold Spring Harbor during the next five summers. This program began in 1945 and was the impetus for the development of molecular biology.

Charles C.C. O'Morchoe, professor of cell and structural biology and surgery and director of the College of Medicine, was re-elected to the executive committee of the North American Society of Lymphology.

Gary Olsen, assistant professor of microbiology, taught part of a NATO international lecture course on molecular taxonomy in Norwich, England, July 8-22, 1990.

Richard B. Selander, professor of biology and entomology, retired August 31. He came to the University in 1958.

Harold M. Swartz, professor of biophysics, bioengineering, and medicine and director of the Medical Scholars Program, was cited by the Society of Magnetic Resonance in Medicine for nine years of service to the society as a board member and officer.

Edward W. Voss, Jr., professor of microbiology and director of the Cell Science Center, was elected to the Committee of Revision of the United States Pharmacopeial Convention Inc. Voss will serve in the immunology and virology category, Drug Standards Division, from 1990 to 1995. ♦

Alumni News

1930's . . .

Joseph W. Galbreath (MS Zoology '34) recently wrote *Drumbeats*, a short story book. He is active in prairie chicken preservation in Illinois and in preservation of forests and wetlands.

1940's . . .

Riley L. Bowen (MS Biology '47) is retired from teaching biology at Galesburg Senior High School, Galesburg, IL.

1950's . . .

J. Robert Fleischner, MD, (BS '51, MS Physiology '57) is a family physician in Encino, CA.

Ralph Troll, PhD, (BS '57, MS Biology '58) is in his 31st year of teaching biology at Augustana College, Rock Island, IL.

1960's . . .

Frederick Y. Cho (MS '63, PhD Biophysics '69) was promoted to senior member, technical staff at Motorola, Inc., Government Electronics Division, Scottsdale, AZ. In 1989, he received the Dan Noble Fellow Award.

Larry E. Clark (BS Zoology '69) is manager, Environmental and Occupational Compliance Department, Moorman Manufacturing Co., Quincy, IL. He also serves on their advisory board.

John L. Eaton (BS '62, PhD Entomology '66) is professor of entomology and Associate Dean of the Graduate School, Virginia Polytechnic Institute and State University, Blacksburg, VA.

P.H. Hewitt (PhD Entomology '64) is assistant director of research, South African Sugar Association Experiment Station, Mount Edgecombe, South Africa.

James D. Lazell, Jr., PhD, (MS Zoology '63) is president and founder of The Conservation Agency, Jamestown, RI—a non-profit corporation that promotes scientific exploration and research. He is author of 118 publications, primarily on rare and endangered

species around the globe, and recently had *Wildlife of the Florida Keys* published by Island Press, Washington, DC.

Beverly Gail (Browne) Mullen (BS Zoology '67) is a professional nature photographer based in Memphis, NY. *One Camera*, her first solo show, premiered at Beaver Lake Nature Center, Baldwinsville, NY, in February 1990.

Lance G. Peterson (PhD Entomology '68) is development manager, Insecticides, Miticides, Fungicides, and Fumigants, Dow ElanCo, Asia-Pacific area. He is based in Hong Kong.

Ellen Hopkins Rapp (BS Physiology '65) is president of the Maryland State Funeral Directors Association. She and her husband, Richard, own Rapp Funeral Services, Silver Springs, MD, which is the only alternative funeral service of its kind in the Washington, DC area.

Norman Rose (BS Zoology '68) is a chemist for the Metropolitan Water Reclamation District of Greater Chicago. He promotes environmental sciences at local and state science fairs.

1970's . . .

Nancy Edmunds Agafitei (MS '72, PhD Entomology '78) is assistant librarian, Aldine Library, Houston, TX.

Craig L. Bartos, MD, (BS Physiology '77), who was chief of Family Practice, Eielson AFB, North Pole, AK, is now teaching in the Family Practice Residency Program at Scott AFB, near St. Louis, MO.

David S. Behm, DDS, (BS Biology '77) is in private dental practice in Chicago, IL.

Linda S. Birnbaum (MS '69, PhD Microbiology '72) is director, Environmental Toxicology Division, Health Effects Research Laboratory, US Environmental Protection Agency, Chapel

Hill, NC. She is also an adjunct professor at the University of North Carolina.

Paul A. Brewer (BS Ecology, Ethology, & Evolution '78) was installed as president, Illinois Chapter of the Wildlife Society in March. He is a district wildlife biologist with the Department of Conservation, Charleston, IL.

Paula Lee Cho, MD, (BS '66, MS '68, PhD Cell Biology '70) is medical director, Emergency Department, Valley Lutheran Hospital, Mesa, AZ. She is immediate past president of the Arizona Chapter, American College of Emergency Physicians.

Frederick H. Drazner, DVM, (BS Zoology '68) is chief of staff, Animal Specialty Services of Cook County, Des Plaines, IL. He recently published a textbook on clinical endocrinology of dogs and cats.

Deborah Freehling, MD, (BS Biology '77) is assistant chief, Otolaryngology—Head and Neck Surgery, Kaiser Foundation Hospital, Santa Clara, CA, and clinical assistant professor at Stanford Medical Center.

Stephen J. Jepsen, MD, (BS Microbiology '77) received a Vascular Surgery Fellowship at Harvard Surgical Service, New England Deaconess Hospital, Boston, MA, for 1989-1990.

Antonio C. N. Magalhaes (PhD Plant Biology '73) is Dean of Biological Sciences and coordinator of the Biotechnology Programme, University of Campinas, Sao Paulo, Brazil.

Douglas J. Mandel (BS '73, MS Biology '75) is an information scientist at Abbott Laboratories, Chicago, IL. He serves as editor of their Information Services Newsletter.

Barry C. McBride (PhD Microbiology '70) is dean of Science, University of British Columbia, Vancouver.

Mecca T. McDonald, MD, (BS Biology '79) is in the General Surgery Department, St. Louis University Medical Center, St. Louis, MO.

Darryl A. Moy (BS Biology '78) is a cardiovascular specialist, Pharmaceutical Sales, Parke Davis. He resides in Ossining, NY.

Masood A.A. Quraishi (MS '74, PhD '76) is chairman of the Department of Forestry, Range Management and Wildlife, University of Agriculture, Faisalabad, Pakistan.

Bruce D. Sidell (MS '72, PhD Physiology '75) is professor of Zoology, cooperating professor of Biochemistry, and Associate Dean for Research, College of Sciences, University of Maine.

Michael Smolensky (BS '64, MS '66, PhD Physiology '71) is professor of Environmental Physiology and director of the Center of Medical and Public Health Chronobiology, University of Texas, Houston. He is investigating human biological rhythms.

James L. Swingler, MD, (BS '75, MS Microbiology '76) is a partner in University OB/Gynecology group and clinical assistant professor, University of Illinois College of Medicine, Peoria. His interests include papillomavirus oncogenesis, colposcopy, and medical lasers.

Marc Woodin, PhD, (BS Zoology '72) is a waterfowl biologist, National Wetlands Research Center, US Fish and Wildlife Service, Corpus Christi, TX.

1980's . . .

Jerome Anderson, DO, (BS Biology '82) is a pathology resident with the USAF, San Antonio, TX. He was chief of Aeromedical Services at Columbus AFB.

Teresa Bodwell (BS Biology '86) is a research assistant, Surgery Brain Research Institute, University of Chicago.

John J. Cassingham, JD, (BS Microbiology '80) is an attorney with Fish & Neave, New York, NY.

Janice Cheng (BS Ecology, Ethology, & Evolution '85) is an environmental protection specialist, Wetlands Protection Section, US Environmental Protection Agency, Chicago, IL.

Jack A. Cohen, MD, (BS Biology '86) is a resident in the Ophthalmology Department, Rush-Pres-St. Lukes Hospital, Chicago, IL.

Melissa Dianovsky (BS Biology '88) is attending the College of Medicine, University of Illinois at Chicago.

John R. Elsen, MD, (BS Biology '86) is a family practice resident at LaGrange Memorial Hospital, LaGrange, IL.

Michael G. Gartlan, MD, (BS Physiology '84) is a resident in Otolaryngology—Head and Neck Surgery, University of Iowa Hospitals and Clinics, Iowa City.

Leah Gavish, PhD, (MS Ecology, Ethology, & Evolution '81) recently completed a post-doctorate in the Pharmacology Department, Hadassa Medical School, Jerusalem, Israel.

Brian C. Hampson (BS '81, MS '83, PhD Microbiology '88) is a microbiological scientist for Filray Foods, a McCormick Company. He was formerly with the USDA Western Regional Research Center, Berkeley, CA.

Laurie Irons (BS Biology '87) is a second-year medical student at the University of Illinois at Chicago.

John W. Kamysz (BS Biology '86) received his MD degree from Rush

Medical College in June 1990 and is a resident in genitourinary surgery at Henry Ford Hospital in Detroit, MI.

Roopa R. Karlamangla (BS '86, MS Plant Biology '88) is a second-year medical student, University of Illinois at Urbana-Champaign.

Andrew Korkkimo (BS Microbiology '87) is a second-year medical student at Northwestern University, Chicago. He is active in the NU STOP AIDS program, which increases AIDS awareness among Chicago high school students.

Andrea Jo Leslie (BS Honors Biology '89) is working with the Peace Corps as a forestry extension agent for about 45 villages in southern Senegal, West Africa.

E. Douglas Lewandowski, PhD, (MS Physiology '82) is assistant professor of medicine, Section of Cardiology, Baylor College of Medicine, Houston, TX. He is researching myocardial ischemia with magnetic resonance.

Darcia A. Merritt, DPM, (BS Biology '86) is a podiatric resident at Illinois Masonic Medical Center, Chicago.

Howard B. Oller (BS Ecology, Ethology, & Evolution '89) is an environmental auditor with the Environmental Audit Department for Waste Management, Inc., Oak Brook, IL.

Christine Reising (BS Microbiology '89) is a research and development technician for Abbott Laboratories, Chicago, IL.

Ann I. Ryan (BS Biology '86) is a medical student at the University of Illinois, Chicago.

Basil M. Salaymeh, MD, (BS Biology '82) is a fourth-year resident in general surgery at the Medical College of Wisconsin at Milwaukee. He is

married to **Marianne Lanman** (BA '82).

Joseph D. Schrag (MS '80, PhD Physiology '84) is working at the Biotechnology Research Institute in Montreal, Quebec, studying protein structures using x-ray diffraction patterns. He is married to **Joan Martin** (MS Physiology '80).

Marc I. Sharfman, MD, (BS Biology '83) is a third-year resident at the University of Massachusetts Medical Center, Worcester.

Dana K. Sligar (BS Microbiology '87) is finishing a 2-year training program with the Illinois State Police to be a forensic scientist in serology.

Nicholas R. Staten (BS Microbiology '85) is a research biologist in corporate research, Monsanto Co., St. Louis.

Charles H. Tadros, MD, (BS Human Physiology '86) is conducting a year of basic research at Washington University School of Medicine, Department of Plastic Surgery. He will begin an internship in 1991.

Kimberly E. Weyneth, DDS, (BS Microbiology '84) is practicing dentistry at the Suburban Heights Medical Center in Chicago Heights, IL. ♦

In Memoriam

David A. Benkowski, a MS student in Biology, drowned in a boating accident on Lake Shelbyville, near Shelbyville, IL, on July 4, 1990.

Frank J. Lanier (MS '49) died November 24, 1989 in a plane crash at Colorado City, CO; he was both builder and pilot of that plane. Frank taught biology, retiring from Chicago State University in 1980. He also sold life insurance for Mutual of New York. ♦

Dr. Leroy Hood Presents First Annual Hong Lecture

"The molecular basis of immune recognition and autoimmune diseases" was the topic of the First Annual Roy and Eva Hong Lecture in Molecular Biology.

Dr. Leroy Hood, Bowles Professor of Biology and the Director of the Cancer Center at the California Institute of Technology, initiated this new lecture series on May 2, 1990.

Dr. Hood discussed his research on a model immune disease in mice that resembles multiple sclerosis and how antibodies directed against a few receptor chains on T-cells (a type of lymphocyte) can block or reverse the onset of disease. Using various genetic approaches, he is now attempting to determine whether

Roy &
Eva
Hong



these principles hold true in the human autoimmune disease, multiple sclerosis.

Dr. and Mrs. Hong of Wild Rose, Wisconsin, whose generous gift to the School of Life Sciences supporting molecular biology and this lectureship, were in attendance. Dr. Hong is a retired physician and an alumnus of the University of Illinois.❖



Ned Siegel, President of LAS Alumni Association

Ned R. Siegel (BS Biology '72; MS Botany '73), from Belleville, IL, is serving as the fourth president of the College of Liberal Arts and Sciences Alumni Association Board. Siegel is senior research specialist for Monsanto Company in St. Louis.

Siegel has been actively involved with the University's alumni activities since graduation on both local and university levels. He explains his involvement by saying, "My LAS education provided the foundation for a career in biotechnology, a word that had not even been defined when I was in school. My involvement on the LAS board serves to somehow repay the institution for its role in my personal development."❖

Robert Fraley to Receive Alumni Achievement Award

Dr. Robert T. Fraley, Director of the Plant Science Technology Division of Monsanto Company, will receive the Alumni Achievement Award during Homecoming festivities on October 20th.

Dr. Fraley received an AB in General Biology in 1974 and a MS in 1976 and a PhD in 1979 in Microbiology. He joined Monsanto in 1980 and was put in charge of the plant molecular biology group, whose task it was to develop better crops.

He and his colleagues discovered a way to transfer useful qualities, such as resistance to disease or drought, into crop plants using genetic engineering. And over the past 10 years his group has developed an array of crops—tomato, potato, alfalfa, tobacco, and cucumber—that are resistant to viral infections.

In 1986 in recognition of this pioneering research, Dr. Fraley and two other Monsanto scientists received the Charles A. Thomas & Carroll A. Hochwalt Award for innovative basic science of the highest calibre. Howard A. Schneiderman, Senior Vice President, Research & Development at Monsanto said, "Innovative research like this will help make farming a more reliable, more profitable business."

We congratulate Dr. Fraley on this award.❖

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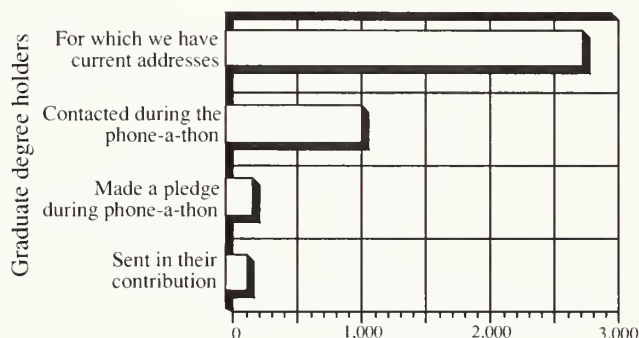
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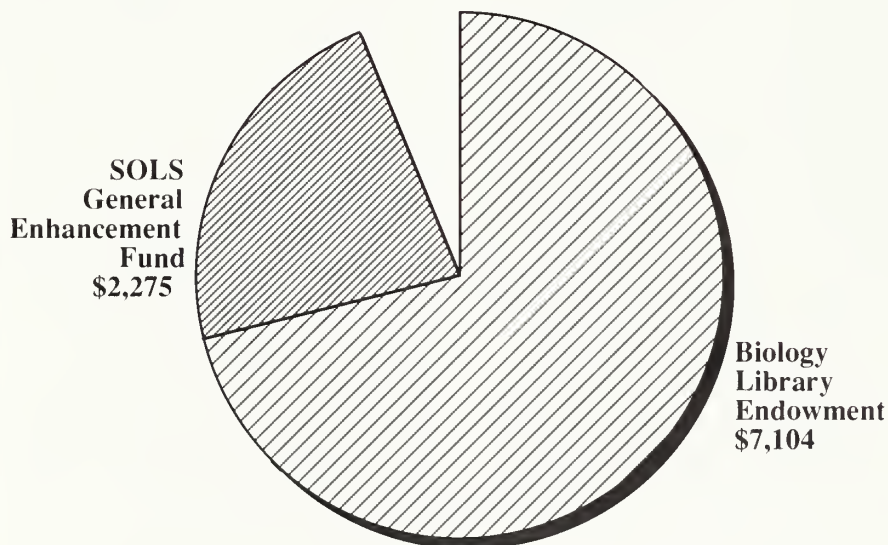
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This spring, SOLS graduate degree holders were asked to contribute to a new alumni fund to support the School of Life Sciences, its departments and programs. We set a goal of \$10,000 to be used to help support the biology library and as a general School enhancement fund. And we reached almost 94% of that goal by the end of August.

Students spent 153 hours on the phone, placing 2,796 calls. And of those graduate degree holders contacted during the phone-a-thon, over 75% sent in their pledged contribution.



Although we did not quite reach our goal of \$10,000, we received \$7,104 for the biology library endowment and \$2,275 for the general SOLS enhancement fund, for a total of \$9,379.



The margin between a good and an outstanding program is often the outside support received from alumni, friends, and private corporations. We appreciate the support and demonstration of confidence in SOLS's programs. Thanks for making this first annual fund drive a success!

Miller Named Head of Microbiology

Charles G. Miller was named Head of the Department of Microbiology on August 21, 1990. He also serves as Head of Microbiology for the College of Medicine, Urbana-Champaign.

Dr. Miller comes to the University of Illinois from Case Western Reserve University, Cleveland, Ohio, where he was on the faculty since 1970. From 1978 to 1981, he served as Acting Chairman of the Department of Microbiology.

Dr. Miller received his BA in Chemistry from Indiana University in 1963 and his PhD in Biochemistry from Northwestern University in 1968. From 1968 to

1970 he was a postdoctoral fellow at the University of California, Berkeley.

Dr. Miller has an international reputation as an excellent scientist. His research focuses on protein degradation in bacteria and has important implications in biotechnology, where overproduction of genetically engineered proteins is often limited by proteolysis.

He has also made important contributions to understanding how oxygen regulates gene expression.

The hallmark of Dr. Miller's work is his use of sophisticated



genetic and biochemical approaches in understanding complex biological problems.

Dr. Ralph Wolfe has served as Acting Head for the department during the last year.❖

Teaching Teachers

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teachers in central Illinois the opportunity to not only learn scientific facts, but also to organize them into a meaningful and useful framework and to address the ethical issues that genetic engineering and biotechnology raise for society.

"Science teachers have been criticized for doing an inadequate job of teaching. However, our workshop participants are truly interested in keeping their students excited about the sciences." Teachers give up their free time during the summer to keep up with fast-moving developments in the field. Teachers do receive a small stipend to help defray expenses.

A goal of these workshops is to encourage the teachers to incorporate what they learned into their classrooms. "Ninety-seven percent of their students will never pursue science-related careers; however, they will make decisions that affect society and they must be scientifically literate—they must learn how to think critically. And molecular biology provides a neat entree into critical thinking for the student."

This summer's program for high school teachers was supported by a grant from the Howard Hughes Medical Institute and for community college teachers by a National Science

Foundation Undergraduate Faculty Enhancement Award.

The learning experiences won't end with the summer. Saturday morning get-togethers are planned for this fall so that the teachers can share their experiences.❖

School of Life Sciences Alumni Newsletter is published semi-annually by the School of Life Sciences, University of Illinois at Urbana-Champaign. Comments and suggestions are welcome and should be addressed to: Jana Waite, Editor, School of Life Sciences Alumni Newsletter, 393 Morrill Hall, 505 S. Goodwin Ave., Urbana, IL 61801.

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Teaching Teachers

How can the University of Illinois and the School of Life Sciences assist teachers at high schools and community colleges to be better science teachers? How can we help update and upgrade their knowledge in molecular biology and biotechnology? How can we help them to understand the bioethical issues and how to teach them effectively?

One step toward addressing these questions is a series of summer workshops on genetic engineering and biotechnology conducted for high school and community college science teachers by Dr. George Kieffer, Associate Professor of Ecology, Ethology, and Evolution. "We

look at these workshops not only as a refresher—but as refreshment. A chance to foster learning for learning's sake." Dr. Ellis MacLeod, Associate Professor of Entomology, collaborated with Dr. Kieffer in the program for community college teachers.

For two weeks during the summer, Dr. Kieffer provides formal instruction and hands-on laboratory experiences with state-of-the-art lab techniques in the biological revolution, the changing concept of the gene, vectors, tumor viruses and oncogenes, monoclonal antibodies, molecular evolution, and human gene therapy, just to mention a few of the topics

covered. Participants have the opportunity to isolate and map DNA, look at the structure of chromatin, detect specific genome sequences, and do some genetic engineering. Guest lecturers and visits to labs round out a full and intensive agenda for the teachers.

"Most teachers who attend the workshops have never had instruction in molecular biology or biotechnology," says Kieffer. "And yet molecular biology has revolutionized science and is a foundation stone for grasping many biological concepts." The workshops this summer provided 25 high school and 20 community college science

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Carl Woese: Thoughts on Biology

Carl Woese, professor of microbiology, MacArthur award winner, member of the National Academy of Sciences, and discoverer of archaeobacteria, reflects on his views of the course of modern biology.

Ed.: You say that you are concerned that biology is becoming an other-directed discipline. What do you mean?

CW: Every science has basic and applied aspects. The basic questions arise from within the science *per se*; they concern the nature of the subject. The applied questions come from without; they are concerns of the society at large that the science is equipped to address — in the case of biology, medical, agricultural, environmental concerns. In studying the applied questions a science helps the society, acts as a handmaiden. In studying the basic questions, it increases mankind's knowledge (for better or for worse) and thereby plays the role of pathfinder. A healthy science attends to both its basic and applied sides. Biology today is not healthy. Increasingly, the problems it studies are of an applied nature, defined by society; it shows less and less concern with its basic problems, with what the science of biology is. The ship of biology today no longer has a skipper; it no longer charts its own course; it sails according to the winds of social concern. All this hoop-la about sequencing the human genome is the prime example of what I mean. The enormous medical benefits we are told



Carl Woese, professor of microbiology

will come from this costly enterprise, totally define our approach to it, and cause biologists to overlook the fact that there are good reasons, basic reasons, for sequencing genomes, but not necessarily the human genome. Worse, this applied, myopic definition of the genome problem will probably result in a lot more money being spent to get the answers they are looking for, the applied answers, than is necessary. You don't go to the Moon before you get some experience in suborbital and Earth-orbital flights.

I feel biologists have to get back to an internally defined course, i.e. to ask what the basic questions in their science are, and put significant effort into those questions.

Ed.: What are the basic questions in biology?

CW: Well, let me tell you what I think at least one of the most basic problems in biology is, the problem of evolution. This is something that has been badly neglected and downplayed during the molecular revolution in biology. However, it is where I focus my attention. Reconstructing the history of life on this planet, and

getting to the point of being able to say something about the universal ancestor of all extant life, and then about the origin of life itself, are for me absolutely central biological problems.

Ed.: How do you go about constructing the history of life on Earth?

CW: You don't do it in the usual way, by interpreting fossils. Organisms that produce informative fossils, the multicellular forms that is, have been around for a mere 500 million years or so, a small fraction of the 4.5 billion years this planet has been in existence. Most of the history of life on this planet has been written by organisms too small to see, unicellular organisms like bacteria. They've been around almost as long as the planet itself. Since you have no fossils to go on, you have to infer their history by comparing the existing forms to one another — first figuring out their family trees, and then, knowing these, inferring which properties are ancient, ancestral. In that way you can build up a picture of ancestors long gone.

Ed.: This sounds simple and straightforward. Why wasn't it done long ago?

CW: As I've said the history of life on this planet more or less turns upon the evolutionary history of the bacteria. Unfortunately, bacteria are very simple in shape, in life cycles, etc. They are so simple that it is easy for the same characteristic to evolve more than once. Consequently, if two different bacteria are similar in some respect, you don't know whether this is because they are related or not. For that reason all attempts by the early microbiologists to determine the genealogical relationships among bacteria, up through the 1960s at least, failed. As you might expect, microbiologists long ago gave up on ever determining the relationships among bacteria; they even went so far, unfortunately, to believe that these relationships could never be determined, and that

they were unimportant even if they could be! Needless to say, microbiology is a field that developed almost untouched by evolutionary considerations. Now that bacterial relationships can be determined things are different.

Ed.: What has changed that now allows the determining of bacterial evolutionary relationships?

CW: Bacteria may be very simple under the microscope and by other classical characterizations, but at the molecular level they are just as complicated as the multicellular forms. And macromolecules, nucleic acids and proteins, contain an astounding amount of historical information. Therefore, the sequences of macromolecules, such as ribosomal RNA (rRNA), hold the key to reconstructing genealogical relationships among all organisms.

The first protein was sequenced in 1952, if I recall correctly, and by the 1960s scientists had begun to realize that by comparing protein sequences you could determine genealogical relationships. A 1965 paper by Zuckerkandl and Pauling laid out this approach in vivid, convincing detail. But because they had become generally apathetic to evolutionary matters, microbiologists did not pick up on this in any significant way, until we got started using the rRNA approach back in the late '60s and early '70s. Then things went from bad to better to great.

Ed.: In 1977 you discovered the archaeobacteria.

CW: And those certainly weren't predicted. rRNA is universally distributed, and because some parts of its sequence are changing rather slowly, and other parts are changing more rapidly, it's a good device by which to time the relatively rapid evolutionary events, and intermediate events and the slower events. It's like having a watch with an hour, minute and second hand.

Ed.: How will microbiology be different when it knows more or pays more attention to the evolution of microbes?

CW: First, it will be a better run shop, because an evolutionary framework gives you an organization that you don't otherwise have. If someone is working on organism *x* and someone else on organism *y*, and suddenly you learn that *x* and *y* are very closely related, then the approach taken might change. I'll give you a practical example. We found out the bacteroides, which are anaerobes, are related to the flavobacteria. Nobody had known this, looking at their phenotypes. And the reason is not because they don't have anything in common, but because anaerobes are studied by a completely different set of criteria. But now that microbiologists know they are related, it behooves them to try to find out in what ways they are related, other than just this neutral measure — the rRNA.

Ed.: Where are your interests leading you now?

CW: There's a particular problem I'm interested in, called the tempo-mode problem, that I think can best be addressed at the microbial level. If my interpretation is correct, it implies that large evolutionary changes are all associated with large planetary, global shifts. So there's going to be this wonderful connection between geologic change and evolutionary change. You see, that is a direction in which microbiology couldn't effectively move before. I look for microbial ecology to get a boost from all this and certainly the relationship between microbiology and geology to get a real boost from this.

From the New Director

I was greatly looking forward to spending the 1989-90 academic year immersed in the world of microbial ecology. After completing my fifth year as head of the Department of Microbiology, I had arranged what would surely have been a wonderfully satisfying sabbatical year shared between Indiana University and the University of Illinois Center for Advanced Study. So how is it that I decided to forego what I (and my family) considered a well earned respite from administrative duties and accepted the Dean's invitation to become the Director of the School of Life Sciences?

Two factors influenced my decision. The first relates to the vitality of our discipline. By any standard, the biological sciences are alive and well. One needs only to scan the daily newspaper to appreciate that we are in the midst of a revolution in the life sciences that will certainly stretch well into the next century. The School of Life Sciences is already sharing center stage with the finest of America's research universities in contributing to this revolution and in my view is poised to make an even greater impact as it strives to enhance its research programs in the areas of molecular and cell biology, structural biology, population biology, evolution, ecology, genetics, the neurosciences and biotechnology.

The second factor relates to resources. The flourishing of talent whether in research or teaching requires adequate resources. I was, thus, additionally inspired by what I perceived to be a renewed commitment to preeminence in biology by the Urbana-Champaign campus higher administration.

Working together with a committed and talented faculty and administrative staff, it will be my privilege to serve the School as its administrative leader and so help guide its activities. Let me outline several initiatives which will occupy us this year.



Jordan Konisky, Director

With the action of the Illinois General Assembly last summer and the strong emphasis that the governor placed on the funding of education, the university enjoyed an excellent budget year. This has allowed the campus to begin to address long standing needs in several academic units across the campus including the School of Life Sciences. As a result, SOLS has been awarded new resources and we are beginning to repair the damage which has resulted from more than a decade of budgetary restrictions. Plans are now underway to remodel several teaching laboratories in the Natural History Building. Resources have also been made available to purchase much needed laboratory equipment and computers for our undergraduate teaching laboratories. These resources also make possible a reorganization of the biology core curriculum, and several faculty committees under the leadership of Associate SOLS Director Stanley Friedman have been working to bring this about.

Based on a proposal developed by several School faculty, SOLS has been awarded a \$1.5 million grant from the Howard Hughes Medical

Research Foundation to both enhance and improve our undergraduate teaching programs. As described in the accompanying report, the award is multifaceted and is being used to both upgrade teaching laboratories and to provide stipends to support the participation of a greater number of undergraduate students in research projects under the direction of SOLS faculty. The award will also be used to provide new equipment for the SOLS Honors Biology program, while other funds will be directed to support the development of programs to attract an increased number of minority students to SOLS academic programs.

An important component of our Hughes program will be summer workshops for high school and community college teachers. As part of the outreach program, Professor George Kieffer will be teaching a course in Chicago in Spring 1990 for high school biology teachers. SOLS is also working with the College of Education to develop a biology course, including laboratory, for the training of future secondary school biology teachers. Such programs reflect SOLS' commitment to actively participate in efforts to improve science education in Illinois high schools and community colleges.

Through the efforts of former SOLS Director Sam Kaplan, the School of Life Sciences will be the recipient of its first major capital project since construction of Morrill Hall in 1966. Planning is well underway for a new chemical sciences-life sciences research laboratory complex which is planned for construction in 1991. The \$73 million project will include two buildings along Goodwin Avenue connected by a bridge over California Avenue. California Avenue will be closed to vehicular traffic and converted to a mall leading from the main quadrangle to the Krannert Center for the Performing Arts.

Current plans are to house both the Department of Cell and Structural Biology and the Department of

James Conley

Microbiology in the new building. However, the new building will also benefit those departments housed in the Morrill Hall-Burrill Hall complex. For example, reassignment of space released by Microbiology to the Department of Physiology and Biophysics will address that department's severe space shortage. Similarly, moving Microbiology and Cell and Structural Biology faculty out of Morrill Hall will help alleviate very serious space problems for the Departments of Entomology, Plant Biology and Ecology, Ethology and Evolution.

The new building will also benefit SOLS undergraduate teaching programs. While we are using some of our new resources to reorganize our undergraduate curriculum and to improve our laboratory offerings, we remain hampered by a shortage of high quality teaching laboratories. This situation will soon worsen as we begin to meet the demands of a new clientele of undergraduate students from outside of the School of Life Sciences who will enroll in SOLS biology courses as part of the newly approved campus guidelines on general education. As faculty move their research laboratories from Burrill Hall into the new building, it is our intent to convert a significant amount of the vacated space into modern teaching laboratories.

The future appears to hold much promise. I look forward to working together with faculty, students and staff as well as with our alumni as we work towards our goals. You can look forward to news of our efforts in the months ahead.

Hughes Award Boosts Undergraduate Program

SOLS has received \$1.5 million from the Howard Hughes Medical Institute. The funds from this five-year grant will be used to help upgrade science teaching in high schools and community colleges, to develop retention programs for minority students in SOLS, and to improve the laboratory portion of the undergraduate educational program.

In the spring of 1990 George Kieffer, associate professor, will teach a course in genetic biotechnology and biotechnology to fifteen Chicago public school teachers.

"We have to help teachers get their students excited about biology," Kieffer said. The grant will also provide equipment that high school teachers can borrow — microfuges, power supplies, and gel driers that are not usually available in high school science laboratories.

Some of the Hughes dollars are earmarked to support undergraduates doing independent research in faculty laboratories. Currently students who participate in research projects receive academic credit. Funds from the grant will enable SOLS to give some students stipends, an important consideration in providing opportunities to minority students, who may be more dependent on part-time and summer employment to pay college expenses.

Finally, some of the grant dollars will go toward developing a new laboratory course in cell biology for undergraduates, and to replacing some outdated equipment in the honors biology laboratory.

Joseph R. Larsen: 1927-1989

Joseph R. Larsen died on February 17, 1989. He was director of the School of Life Sciences from 1973 to 1984, and from 1970 to 1975 he served as head of the entomology department. After leaving SOLS, he served as director of rehabilitation services for the University.

Larsen received bachelor's and master's degrees from the University of Utah and a doctorate from Johns Hopkins University.

In 1987 he was inducted into the National Hall of Fame for Persons with Disabilities. He received the first honorary membership in the Association for Biology Laboratory Education in 1986. He was a member of the Illinois Department of Rehabilitation Services advisory council, Entomological Society of America, Sigma Xi, American Physiological Society, and a fellow of the American Association for the Advancement of Science.

M. Raymond Lee: 1928-1989

M. Raymond Lee, professor of ecology, ethology, and evolution since 1961, died on July 4, 1989. He was also curator of mammals at the Natural History Museum since 1983.

Lee received his undergraduate and graduate degrees from the University of Utah. He was a member of the American Society of Mammalogists and edited the *Journal of Mammalogy* for two years. He was also a research affiliate with the American Museum of Natural History, a member of the University of Illinois Senate for two years, and a member of his department's advisory committee. He taught organic evolution and field courses in mammalogy, and carried out a research program using karyology to study speciation and phylogeny in mammals.

Biology Library Moves Forward

Students are six to a table in the reading room; the work room hums with human and computer talk, and Elisabeth Davis, Biology Librarian, is interviewed in her office, unprotected by a secretary, intermittently answering phone calls, one ear plugged to listen for problems at the circulation desk.

Asked what has changed in the Biology Library since she began in the early 1970s, Davis replies, "Everything! The catalog is online, students have access to the stacks, and the literature in biology has proliferated."

Unfortunately, the library's budget has not kept pace with these changes. Lean years starting in the early 1980s and very severe budget cuts in 1987-89 have threatened the library's strength in all areas. A substantial acquisition budget increase in 1989-90 helped to reverse the trend, but the accumulated needs of the library worry Davis.

"I am most concerned about the serials collection," she says. One of the strengths of the UIUC library system has been the completeness of its serials collection. Davis points out that even during the difficult years of the second world war the library maintained its journals, but now there are gaps.

Inflation, the decline of the dollar overseas, and the ever increasing cost of journals make it difficult to pay everything that faculty and students want and need. An average journal subscription costs one to two hundred dollars, but it is no longer unusual for a publication to cost a thousand dollars or more. The Biology Library's most expensive serial costs over five thousand dollars — Davis splits that cost with the Chemistry Library.

As a unit within the UIUC library system, the Biology Library's funds come from the library's allocation. There has always been a close association, however, between the Biology Library and the School of Life



Elisabeth Davis, Biology Librarian

Sciences and its departments. SOLS remodeled the library reading room, provided a CD ROM station for electronic literature searches, and helped to automate the library by supplying computer terminals. In fact, the Biology Library was the first of the departmental libraries to offer user access to online databases.

Donations to the SOLS Alumni Fund would be used in the Biology Library to create an endowment for the purchase of new serial titles that are not available elsewhere on campus.

"We've been practicing survivorship," says Davis. "To remain current, faculty and students must have access to journals. We have a commitment not only to the people on the Urbana campus, but we serve as a state-wide resource for biological research as well."

Alumni News

1938

Ralph W. Dexter (Ph.D. Zoology) writes that he is now Emeritus Professor of Biological Sciences at Kent State University and is writing up fifty years of accumulated research notes. With few exceptions, he has visited the U. of I. campus every year since 1938 for meetings, library research, and visits with friends.

1950

Grover J. Norwood (M.S.) is in his sixteenth year of retirement from teaching high school sciences, university extension courses, and courses in nursing school. He is now an avid insect collector — "a fascinating hobby at age 77."

1959

Anthony E. Liberta (M.S., Ph.D. Botany '61), Professor of Biological Sciences at Illinois State University,

was selected by the ISU College of Arts and Sciences to deliver a campus-wide lecture on his mycological research. This honor recognizes Dr. Liberta for his professional and research activities.

1963

Leroy Hasselbring (B.S., M.S., Biology Teaching '64) is a science teacher for the Department of Defense Schools overseas. He is currently teaching at a naval base in Bermuda, which he reports is a "very good location for mid-Atlantic water and atmospheric studies."

Roger J. Lederer (B.S., Ph.D. Zoology '72) is associate dean of the graduate college at California State University, Chico, Calif.

1964

Jack Shouba (M.S.) teaches biology and chemistry at Lyons Township High School, Western Springs, Ill. He is also president of Save the Prairie Society, a prairie preservation group active in the Chicago area.

1965

Satish R. Chandran (Ph.D. Entomology) is professor of biology at Kennedy-King College in Chicago, and adjunct professor of anatomy at Lewis University, Romeoville, Ill.

1967

Arnold R. Brody (M.S. Zoology) earned a Ph.D. at Colorado State University and is professor and head, Pulmonary Pathology Laboratory, National Institute of Environmental Health Sciences in Raleigh, N.C. He is also an adjunct faculty of the Duke University pathology department and of The Toxicology Program, University of North Carolina.

1970

Richard H. Baltz (M.S., Ph.D. Microbiology '71) is a research advisor in the department of molecular genetics at Lilly Research Laboratories, Eli Lilly and Company, Indianapolis, Ind. He currently heads a group developing recombinant DNA technol-

ogy in actinomycetes and filamentous fungi to produce novel antibiotics.

1971

Andrew K. Chien (Ph.D. Zoology) earned an M.B.A. in accounting from California State University, and now has a C.P.A. practice in California.

1972

Marc Mangel (M.S. Biophysics) earned his Ph.D. at the University of British Columbia and is now professor of zoology and adjunct professor of agricultural economics, entomology, University of California, Davis. He recently published a book, *Dynamic Modeling in Behavioral Ecology*. His research is in ecology (use of protein polymorphism for salmon management, models of southern ocean krill fisheries) and evolutionary biology (timing of life history events, host choice by insects, and the evolution of intelligence).

Charles R. Peterson (B.S., M.S. Zoology '74) earned his Ph.D. at Washington State University, and is assistant professor of biological sciences at Idaho State University, where he is also curator of herpetology at the Idaho Museum of Natural History.

1974

Robert R. Giering (B.S. Microbiology) earned his D.D.S. degree at U. of I. Medical Center, and is now a dentist with practices in and near Chicago. He is also assistant clinical professor at Loyola University Dental School, and became a fellow in the Academy of General Dentistry July 1988.

John F. Hasler (Ph.D. Zoology) is co-owner and technical director, Em Tran, Inc., Elizabethtown, Penn.

1975

Hemlata S. Bhakoo (M.S., Ph.D. Physiology and Biophysics '77) is an embryologist in the *in vitro* fertilization program at Children's Hospital, Buffalo, N.Y.

Huang Chi-Ying (Ph.D. Biology) is professor and head of the botany department at National Taiwan University, Taipei.

1976

Al Reaves (Ph.D. Physiology) is the manager of Glaucoma Clinical Sciences at Alcon Laboratories, Inc., Fort Worth, Tex.

1977

Myron O. Kaminsky (B.S.) earned his D.P.M. degree at Illinois College of Podiatric Medicine in Chicago. He has a private practice in podiatric medicine and surgery, Rochester, Minn.

1978

Suzanne E. Fisher (Ph.D. Cell Biology) is a health sciences administrator in the Review and Special Projects Office, National Eye Institute, National Institutes of Health.

1979

Peter J. Shoji (B.S. Biology) earned his D.O. at Southern College of Optometry and has a private practice in Honolulu where he specializes in water sports vision and contact lenses.

1980

Bruce A. McPheron (M.S. Biology, Ph.D. Entomology '87) is assistant professor of entomology, Pennsylvania State University.

Charles F. Siegel (B.S., M.S. '85) is assistant curator of birds at the Dallas Zoo and has begun doctoral studies in wildlife and fisheries science at Texas A&M University on a Regent's fellowship.

Lance E. Urren (B.S. Ecology, Ethology, and Evolution), earned his Ph.D. in genetics at UC-Davis and is a post-doctoral research fellow at Johns Hopkins University in the Division of Reproductive Biology, Department of Population Dynamics.

1981

Gene Buksa (B.S. Biology, D.D.S. '85, M.S. '87) has recently opened a practice limited to periodontics in LaGrange, Ill.

Susan Buss Muldoon (B.S. Biology, M.P.H. '85) is a doctoral candidate at the University of Pittsburgh, where she is studying the epidemiology of chronic diseases. Her husband, Sean Muldoon (M.D. '87) is a resident in internal medicine at the University of Pittsburgh.

1983

Vicki L. Chamberlain (B.S. Biology, M.D. '87) and Benjamin A. Hagan (B.S. Physiology, M.D. '87) were married while at the U. of I. College of Medicine in Rockford, and are now living in the Detroit area. Vicki is a resident in obstetrics and gynecology at Wayne State University; Ben is a resident in family practice at William Beaumont Hospital.

1984

Martha J. McNabb (B.S. Microbiology, D.D.S. '88) has opened a practice in the Chicago Loop.

David M. Mochel (B.S. Biology, M.D.) is a resident in the Orthopaedic Surgery Program, Grand Rapids, Mich.

1985

Kenneth Muranaka (M.S. Biophysics) is a quantitative analyst for the Yasuda Trust and Banking in Tokyo. His research interests are in the stochastic process governing the financial market, and he has recently published a book in Japanese on financial theory.

Jeff L. Young (B.S. Biology) graduated from the University of Kansas School of Medicine in May, 1989.

1986

Deborah A. Nehr (M.S. Plant Biology) is pursuing a doctoral degree in plant pathology at the University of California-Davis.

George I. Sreckovic (B.S. Biology) is a student at Rush Medical College in Chicago.

Brian M. Terry (B.S., M.S. Biology '87) is a medical student at UIC College of Medicine.

1987

Karen Crawford (Ph.D. Anatomy) is a postdoctoral fellow at La Jolla Cancer Research Institute, La Jolla, Calif.

Debra A. Levinthal (B.S. Biology) is a student at William M. Scholl College of Podiatric Medicine, Chicago, where she is a teaching assistant in the anatomy department.

Liang-Shiou Lin (Ph.D. Plant Biology) is a postdoctoral research fellow in the biology department at Washington University, St. Louis, MO.

Pamela K. Pellico (B.S. Biology) is a quality control technologist for Keebler Co., Elmhurst, Ill.

Let Us Hear From You

Return to:

SOLS Alumni Newsletter
390 Morrill Hall
505 South Goodwin Avenue
Urbana, IL 61801

Name _____

Address _____

State and Zip Code _____

J. of I. degree(s) and year(s) _____ Dept. or Program _____

Additional degree(s) _____

From where? _____

Current Activity/Employment _____

Has another publication done a story on you? If so, please send a copy to the SOLS Alumni Newsletter.

A Word to Graduate Degree Holders . . .

This spring graduate degree holders will be asked to contribute to the SOLS Alumni Fund, a new fund being developed to provide additional support to the School of Life Sciences, its departments and programs.

A particular focus for the first year of the fund will be the Biology Library (see page 5). As the cost of books and serials increases, the library will use the additional support from the Alumni Fund to maintain the quality of its collection. As one faculty member said, the library is so good that its users expect it to be perfect. While perfection is not an attainable goal, all those involved with the library are working to keep it the outstanding, accessible collection that it has always been.

The fund will also be used to support graduate fellowships, to provide travel grants for students to attend professional meetings and conferences, and to otherwise contribute to the professional development of graduate students.

Along with the Hughes grant (see page 4) and the Eva and Roy Hong Molecular Biology Research Fund, the SOLS Alumni Fund will use private funds to maintain quality in all areas of concern to SOLS — undergraduate education, research, and graduate training.

In about a month you will receive a mailing asking you to consider becoming a contributor to the SOLS Alumni Fund. Your generous support will help maintain the strength and vitality of the teaching and research program at the School and in its constituent departments.

School of Life Sciences
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School of Life Sciences

// alumni newsletter

spring 1991

Leaf Curl, Virology, & Basic Science

Most of us are well acquainted with the effect of viruses—through a recent episode of a cold or the flu. However, viruses that affect animals, including man, are far outnumbered by viruses that attack plants, according to Sondra Lazarowitz, associate professor of Microbiology and Cell & Structural Biology.

She has spent the last 7 years working on a group of plant viruses called geminiviruses. They cause economically significant agronomic problems worldwide, attacking such crops as squash, maize, beans, mungbeans, and cassava.

With the emergence of DNA technology over the last few years, there has also emerged the hope that disease-resistant crops can be engineered. However, scientists must first understand what the resistance loci are and how they confer resistance.

Using this applied scientific problem as a springboard, Dr. Lazarowitz is addressing some very basic scientific questions, including how a virus operates at a molecular level.

How can a geminivirus, which is extremely small, invade a host plant and literally commandeer the host cell's resources for its own purposes—namely replication and movement? How do viruses trick the host cell and how do they change the function and perhaps even the structure of the host? By addressing these questions, she is also *de facto*

studying gene regulation in the host plant.

Much of her current research is centered on squash leaf curl and maize streak disease. In nature these geminiviruses are harbored in plant reservoirs, usually weeds, and are mechanically transmitted to crops by either whiteflies or leafhoppers.

(continued on page 5)



Photo by Jim Corley, B & W Photography

Dr. Sondra Lazarowitz, associate professor of Microbiology and Cell & Structural Biology.



The Director's Perspective: State of the School of Life Sciences

Excerpt of Remarks Presented to Faculty Members
December 13, 1990

Let me begin by touching on an issue which carries to the very core of the University and what we do for a living. Accountability seems to be the word of the day. Universities, especially research universities, are being asked to justify the way in which they go about their business. Questions are being raised as to what faculty actually do. Many people believe that we are over-paid, that we care more about research than teaching, that their sons and daughters are not getting their money's worth, that taxpayers are getting a poor return on their investment, and that most of us spend our time working on research problems of little real importance and with little chance of impacting society in the near future.

We need to address these concerns and attitudes. One way to do this is to ensure that our instructional programs are sound and that we provide good advising and mentoring. We need to make the point that research and teaching are intertwined. We need to emphasize that our research programs do relate to undergraduate teaching; that our research programs make us better teachers; that by bringing undergraduate students into our laboratories, we not only teach them how to do research but provide them the opportunity to appreciate the value of basic research. The public needs to understand how faculty research operates within the general context of undergraduate education. This is a message that needs to be repeated often.

Over the course of the last 18 months the School has been engaged in activities which range from revision of

our undergraduate curriculum to designing a new building—with much in between. At times the pace has been frantic. These efforts reflect our need to provide quality instructional programs for our undergraduate students, to train competent teachers and research scientists, and to participate, ourselves, in scholarly activities.

However, we are undertaking these activities in a budgetary climate which is, at best, uncertain. Most economists are predicting an upcoming decline in the economy which will make it more difficult for us to do what is expected of us. I believe that it would be wishful thinking to expect that the University will be the recipient of major new dollars over the course of the next several years.

While the current budget year is not a good one, we are, at least, coming off a very good budget for the 1989-90 school year. That University budget was one of the best in recent memory. For SOLS, this translated into many of the activities that are now underway.

We have in progress a major upgrading of our teaching laboratories in the Natural History Building, and we will begin work in Davenport Hall as soon as the new Biotechnology Laboratory is completed. In addition, a new greenhouse is currently under construction at the Herbarium and plans are in the works for a second new greenhouse facility in the area of the Burrill Hall/Morrill Hall complex. We have also been able to remodel space for both new and established faculty.

Last year we hired a new department head in Microbiology and new

faculty in Entomology, Cell & Structural Biology, and Physiology & Biophysics. A new faculty member recruited the year before joined Ecology, Ethology & Evolution. During the current year, searches are underway for new faculty in Microbiology, Plant Biology, and Cell & Structural Biology.

In early winter, SOLS faculty will move into the new Plant and Animal Biotechnology Research building at the end of Goodwin Avenue. By action of the legislature last summer, the new Chemical and Life Sciences Research Building has received full state funding, and we are now into the design phase of that project. That building should be ready sometime in 1994. This will release much needed space in both Morrill and Burrill Halls so that we can help meet the space needs of those departments which will not be moving into the new building. We also hope that the campus will make funds available so that we will be able to remodel parts of Burrill Hall to increase lecture room space for teaching activities as well as to provide much needed space for the Biology Library.

Let me finish up by stating that I am upbeat about our future. As I visit other campuses and talk to colleagues from elsewhere, I am always reminded of the strength and resiliency of our great University. We have had substantial resources available to us even in rough times. This is the mark of an enlightened higher administration at the campus level.

—Jordan Konisky, Director

Undergraduates Get Hands-on Training in Biotech Careers

by Larry Bernard

Undergraduate students are cloning around at the UI.

In a state-of-the-art biotechnology laboratory, undergraduates learn how to cause mutations in bacterial genes; map, sequence, and analyze DNA; and clone genes—all helping prepare them for biotechnology careers or graduate study.

The course—Microbiology 317, Experimental Techniques in Microbial Genetics—is the brainchild of molecular geneticist Stanley R. Maloy, associate professor of Microbiology.

“In essence, the course takes students to the most basic level of biology,” he said. “They take their own genetic mutation, classify it under classic genetics, determine where it lies on the gene and how it’s regulated, all through state-of-the-art molecular techniques in biotechnology.”

The lab is equipped with microcentrifuges, spectrophotometers, liquid scintillation counters and computers.

“This is a very intensive course,” he said. “They use sophisticated, expensive equipment and learn the same techniques they would use in industry or science.”

In fact, about half of the students who have taken the course have gone into biotechnology fields after graduating. The other half have gone on to graduate work in which they employed those techniques.

“The basic idea is that if they go on to biotechnology companies, the students have a leg up on the compe-



Photo by Bill Wiegand

Senior Roli Prasad receives hands-on training from Dr. Stanley R. Maloy.

tion because these are actual techniques and they have already done them,” Maloy said. “Also, for those going on to graduate study, they can attack important questions of biology right away.”

Maloy designed the course based on a three-week class given to scientists at Cold Spring Harbor Laboratory in New York. Maloy will be teaching that class every summer for the next five years.

“What I teach there to scientists in three weeks, I teach to the undergraduates in a semester,” he said.

A student is given a laboratory strain of salmonella bacteria, but not a strain virulent enough to cause disease. The student isolates mutations in the gene by using trans-

posons—genes that jump from one site to another on a chromosome. Each student gets a cell with a different mutation.

The student then identifies what basic requirement in the gene is missing and maps the chromosome to determine where the gene lies. Then the student studies what regulates that gene.

The remainder of the course is a lesson in molecular biology techniques. The student does a process similar to DNA fingerprinting, or the process by which researchers located the defective gene responsible for cystic fibrosis. The student then clones the gene. ♦

—Courtesy of Inside Illinois

SOLS Supports Graduate Education in Tropical Biology

After a 13-year hiatus, the University of Illinois has rejoined the Organization for Tropical Studies (OTS), which was formed in 1963 by nine North American universities and the Universidad de Costa Rica to promote research and graduate education in tropical biology. The consortium now includes 53 North American and Latin American institutions. Dr. Carol Augspurger, associate professor of plant biology, and Dr. Sandra Brown, associate professor of forestry, serve as Illinois' representatives on the Board of Directors; also Dr. Augspurger serves on OTS' Executive Board as a member-at-large.

The principal base of operations for OTS is La Selva (The Forest), a 3,300-acre rainforest in the Atlantic low-lands of northeastern Costa Rica, about 60 miles north of San José. More than 60% of La Selva is virgin tropical wet forest. Such rainforests cover only 7% of the earth's land surface but contain more than half of the world's plant and animal species.

La Selva has well equipped, modern laboratories, state-of-the-art equipment and computer facilities, and comfortable living quarters that are available to all member institutions. It is often "home" to

over 50 faculty and students at a time.

In cooperation with the Costa Rican government, OTS has access to Braulio Carrillo National Park. The two sites combine to give faculty and students access to over 100,000 acres of unbroken forests, stretching from La Selva's hot rain forests at almost sea level to the cool cloud forests of Braulio at over 8,000 feet. OTS also has field stations in dry forest (Palo Verde) and mid-elevation rainforest (Wilson Botanical Garden) sites.

OTS has trained more than 3,000 North and Latin American biologists in tropical ecology. Two-month-long field courses are conducted at diverse habitats in Costa Rica and encourage

the students' total immersion in tropical ecology with an emphasis on "how to do research on tropical organisms."

Dr. Augspurger is coordinating the fundamental tropical ecology course this spring. Over 60 graduate students from across the U.S. applied for 22 positions in the course. Several graduate students from the University of Illinois have attended this course in the past and she hopes that there will be a continuing stream of our students to the tropics.

From its original mandate to teach fundamental tropical ecology and to facilitate research, OTS has expanded its activities to include more applied training and research as well as conservation. Tropical



An aerial view of La Selva, the principal base of operations for the Organization of Tropical Studies in Costa Rica.

Photo courtesy of OTS

Managed Ecosystems uses the basic ecology course's philosophy and methodology to teach the application of ecological principles to tropical managed systems. Mark Paschke, a graduate student in Physiological & Molecular Plant Biology, attended last summer.

As part of an outreach of its efforts, OTS offers spanish-language versions of all courses. OTS also began an innovative course to educate U.S. policy makers, as well as officers of multinational lending banks and conservation organizations, on tropical biological diversity and the relationship between conservation and development.

OTS, through a grant from the William & Flora Hewlett Foundation, brings U.S. government officials to Costa Rica for an on-site experience with undisturbed tropical habitats and also with the effects of deforestation. A similar workshop was offered to new Costa Rican government officials.

With growing interest in tropical rainforests by "tourists," OTS started a training program in ecology for local village residents to become naturalists and tour guides. The response was overwhelming in a region with serious unemployment. However, it was soon discovered that a limiting factor for the locals was

their inability to speak English, so an English-speaking course is now being offered by OTS.

Membership in OTS carries direct benefits for Illinois with the opportunity to send graduate students to these courses and to provide them with fellowships to continue research at OTS field stations. These stations are also available to Illinois faculty with tropical research interests. More importantly, for the long term, may be the indirect influence of our faculty and students on both the U.S. and Costa Rican governments to help protect these and similar valuable natural resources for our future generations. ♦

Leaf Curl, Virology, & Basic Science

(continued from page 1)

To study them in the laboratory, Dr. Lazarowitz has opted to use a battery of molecular techniques. She and her research group extract the geminiviruses from diseased plants. Using the extracted genome of the virus, she then clones them. The clones are inserted into *Agrobacterium* (the bacteria that causes crown gall disease), which is used as a substitute for whiteflies or leafhoppers. *Agrobacterium* transfers the clones into the host plants, and the normal course of the viral disease then follows.

While conducting a series of experiments, she unexpectedly discovered that the clones of squash leaf curl virus had different host ranges. A naturally occurring mutant (Clone A for our purposes) caused disease in squash, pumpkin and

tobacco, as would be expected. However, another very similar clone (Clone B), while infecting squash and pumpkin, did not cause disease in tobacco. Why was the host range restricted for this clone?

Geminiviruses must do two things in host plants. They must replicate and then they must move. Although most animal viruses are passively moved, plant viruses encode at least one protein to promote active movement.

Dr. Lazarowitz found that both clones were able to replicate themselves in the host cells, but only Clone A was able to move to other cells. Clone B has a mutation in a gene that encodes a movement function. This mutation has changed the host range of the virus since Clone B now does not cause disease

in tobacco, but still is infectious in squash and pumpkin.

Additional research is underway to further understand what, at the molecular level, allows one virus to infect a set of host plants while another similar virus can only infect a subset of these plants. And where in the development of the disease does the virus compromise the host.

These studies should also begin to identify the host cell factors interacting with the viral genomes and regulating their gene expression. Such basic scientific information can then provide the basis of how to rationally block diseases caused by geminiviruses, perhaps eventually leading to improved agronomic crops. ♦

Faculty Briefs

Nancy Burley, associate professor of Ecology, Ethology & Evolution, was elected as an associate in the Center for Advanced Study for 1991-92 to work on a book, *Sex Ratios and the Evolution of Avian Social Organization: A Multi-causal Approach*.

John E. Cronan, Jr., professor of Microbiology, was honored as a University Scholar during the 55th annual meeting of the University of Illinois Foundation. Cronan studies how plants and animals make and use fats. His work has far-reaching implications for agriculture and therapeutic drug technology. Cronan has made major progress toward understanding how fats and proteins interact and how the body uses biotin, or vitamin H. He will receive an annual award of \$12,000 for the next 3 years. Financial support for the program comes from private gifts to the Foundation's Advancement Fund.

Paul C. Lauterbur, professor of Medical Information Science, Chemistry, Biophysics, and Engineering, received the Bower Award in September for his work in nuclear magnetic resonance imaging technology, which provides high-quality images without using X-rays. The award was in recognition of his development of magnetic resonance imaging from 1971 to 1973 and the improvements he has made to the process since then. "It often gives clearer pictures of the soft tissues and organs of the body and things that can go wrong in them as a result of disease than X-rays do," he said. The award, the biggest American science prize given, is \$290,000 in cash. Dr. Lauterbur has received many other awards, including the '87 National Medal of Science and the Fuggi International prize.

Donald R. Ort, professor of Plant Biology, has been elected to the Executive Committee of the American Society of Plant Physiologists.

Edward Voss, professor of Microbiology and director of the Biotechnology Center's Cell Science Laboratory, was named a 1990 LAS Jubilee Professor for his extensive contributions to research in autoimmunity. Voss generated and characterized three monoclonal nucleotide binding anti-DNA autoantibodies from inbred mice exhibiting the humanlike lupus erythematosus syndrome. The award includes \$2,000 in recurring salary and \$3,000 a year for 3 years in non-recurring research support. He was named to the National Lupus Hall of Fame in 1988 for contributions to the field. ♦

Alumni News

1960's...

William J. Keppler (M.S. '61, Ph.D. Genetics & Zoology '65) is dean of the College of Health at Florida International University, Miami, and professor of genetics. He recently moderated a workshop on the treatment of inborn errors of metabolism for a genetics conference at Miami Children's Hospital Research Institute and is team teaching in the new All University Honors Program at Florida International University.

1970's...

Eric L. Dyer, M.D., (B.S. Zoology '70) practices pulmonology. He also reports that he "pursues adulthood,

writes poetry and keeps a Krieb's cycle going in Nashville, TN."

Timothy K. George (M.S. Ecology, Ethology & Evolution '77) is a wildlife biologist for the U.S. Army Corps of Engineers, St. Louis District's Planning Division, Environmental Analysis Branch.

Richard Jonas, M.D., (B.S. Biology '77) is a clinical gastroenterologist at Casa Blanca Clinic, a multi-specialty group in Mesa, AZ.

James T. Kardatzke (Ph.D. Entomology '77) is chief of the Entomological Sciences Division, U.S. Army Environmental Hygiene Activity at North Fort George G. Meade, MD.

Barbara Larrain (B.S. Microbiology '74) has been working for the last 10 years as a senior research assistant, arthritis and rheumatology, doing research on autoimmune diseases using mice models at the Oregon Health Sciences University, Portland.

Ellen Huening Makowski, Ph.D., (B.S. Botany '79) is on the faculty of the University of Texas at Arlington. Her husband Tom is a sociologist with the Soil Conservation Service in Fort Worth. She has two daughters, ages 4 and 8 mos. They enjoy the variety of landscapes in Texas.

Susan Nagele, M.D., (B.S. Biology '78) has been the medical officer in charge of a 36-bed Health Center,

On Becoming A Professional Nature Photographer

Since I turned professional in September 1988 and framed a great number of my nature photographs to offer for sale, I've found that I am the classic 'critical success and financial failure.' Art in general has gone 'down' in the Syracuse (NY) area over the last three years, a reflection of a precipitous decline in our economy.

I was trying to make my photography more visible last spring when I rented space at the Baldwinsville Flea Market; the fact that it closed for the summer in May for lack of customers forced me to rethink my abilities. I turned to horse show photography to (a) make money, (b) gain a new photographic skill, (c) reach new clients, and (d) make money. I achieved (b) and (c). The thank you notes (and checks) that come in from



Photo by Peg Arensen, North Syracuse, NY

horse show clients have been positive reinforcement. I had one photo accepted for the 1990 New York State Fair, which displayed approximately 123 photos of some 600 submitted.

In July I became the Chairperson of Friends of Beaver Lake Nature Center Photography Group, a collection of some 56 local photographers who volunteer their time and talent to help

Beaver Lake Nature Center produce slide shows for their visitors, photographic exhibits with an educational theme, and public relations photos for the media. The Nature Center is trying to acquire additional land to sequester it from development; to help raise money, I staged a 'Polaroid Prowl' at their annual Golden Harvest Festival. I made a sign, hefted my Spectra camera, and walked around the grounds for a solid 11 hours taking pictures of anyone and anything that would pay \$2.

My years as an animal technician for Hobart Muir Smith and Thomas Frazzetta are ones that I do remember fondly. It took me 10 years to get my B.Sc. degree (Zoology '67) but the fact that I could work full time and still take courses at the University of Illinois is one for which I am still grateful some 25 years later. I hope the Big U is still supportive of employees who must work to eat but want to continue to learn in order to enjoy living.—Excerpts from a letter by Beverly Gail "Beagle" Mullen, Memphis, NY

Outpatient Clinic, and Maternal and Child Health Clinic in rural Tanzania as a Maryknoll Lay Missionary for the last 6 years.

Mark E. Peden (B.S. Botany '74) is head of the Chemistry Division, Illinois State Water Survey, Champaign.

Gregory A. Shove, M.D., (B.S. Biology '75) is practicing rheumatology at Racine Medical Clinic, Racine, WI. He was recently appointed to the Wisconsin Society of Internal Medicine Council.

Zenobia L. Sowell, D.D.S., (B.S. Biology '79) is in private practice at Hyde Park Hospital, Chicago, IL.

1980's...

Beth Baker (B.S. Microbiology '89) is a medical research technician at Washington University Medical School, St. Louis, MO.

Carol J. Benzing (B.S. Biology '85) is a fourth-year doctoral student in the Biology Department, University of California, Los Angeles. She is currently conducting ecological research in Big Bend National Park in southwestern Texas.

Lt. Jim Caruso, M.D., (B.S. Biology '84) is a medical officer on the U.S.S. Trenton, a naval amphibious assault ship currently in the Persian Gulf with Operation Desert Storm.

Kathy Empen (B.S. Biology '87) is a fourth-year medical student at the University of Michigan. She graduates in May and plans to go into a pediatrics residency program.

Michael Green, M.D. (B.S. '83, M.S. Biology '87) is a third-year resident physician in internal medicine at Evanston Hospital, Evanston, IL.

Lt. John Hipskind, M.D., (B.S. Biology '83) is a flight surgeon, Carrier Air Wing Nine on the U.S.S. Nimitz. He is applying for an emergency medicine residency program.

Kimberly Hogan (B.S. Biology '88) is in her first year of medical school

at the Medical College of Wisconsin in Milwaukee.

Michael R. Jarvis, M.D., (M.S. '80, Ph.D. Microbiology '82) is in-patient assistant director of Psychiatry, Barnes Hospital, and assistant professor of Psychiatry, Washington University School of Medicine, St. Louis, MO.

Sylvia Kiertscher, Ph.D., (B.S. Biology '82) has a postdoctoral appointment in the Department of Surgery/Oncology, University of California, Los Angeles.

Morris S. Lehrfeld (B.S. Biology '87) will graduate from University of Missouri, St. Louis School of Optometry in May 1991.

Audrey McCormack (B.S. Biology '89) is a second-year medical student at St. Louis University School of Medicine, St. Louis, MO.

Mark L. McKnight (Ph.D. Biology '89) has a NSF-funded post-doctoral research fellowship at the University of California, Davis. He is working with Dr. Brad Shaffer on the evolution of salamanders.

Marshall S. Melcer, M.D., (B.S. Biology '85) is a second-year resident at State University of New York at Buffalo. He married Felicia Fink in August 1990.

Greg O. Meyer, M.D., (B.S. Microbiology '80, M.S.P.H. '82) finished residency in internal medicine at St. Joseph's Hospital in Phoenix, AZ, in June 1990 and is now employed in the Department of Ambulatory Care, Oak Forest Hospital, Oak Forest, IL.

Wilson B. Muse III (B.S. Genetics & Development '87) is a Ph.D. candidate in the Department of Biology at the University of Michigan. He is studying gene regulation of nitrogen metabolism

in *Klebsiella aerogenes* and hopes to receive his degree in 1994.

Daniel A. Volkening, D.C., (B.S. Biology '83) is practicing at Jackson Park Hospital, Chicago, IL.

1990's...

Kurt Alan Foote (B.S. Ecology, Ethology & Evolution '90) is a forestry extension agent with the Peace Corps serving in Senegal, West Africa.

John Schulz (B.S. Microbiology '90) is working as a research technician on the genetic mechanisms of antibiotic resistance in bacteria at the University of

Chicago. He is planning to go to graduate school. ♦

In Memoriam

Dr. Don Charles DeVault, biophysicist in the Department of Physiology & Biophysics, died Nov. 26, 1990, at the age of 74. He came to the University of Illinois in 1977 from the University of Pennsylvania. He received his doctoral degree in chemistry from the University of California at Berkeley. His research speciality was photosynthesis. ♦

Conserving Madagascar

Porter P. Lowry II (M.S. Botany '80) is associate curator and coordinator of the Madagascar Research and Conservation Program at the Missouri Botanical Garden, St. Louis. In an article in the *Alumni News of Washington University (Summer 1990)*, he states that "It's a very exciting time to be in Madagascar."

He is involved in an ambitious conservation program for this biologically endangered island, located in the Indian Ocean 250 miles off the east coast of southern Africa. Many of its plants and animals are threatened with extinction as burgeoning human populations encroach on the wilderness. Already 80% of the lush rain forest has been cut down, making Madagascar the world's foremost conservation priority in the eyes of many scientists and conservationists.

With the help of a grant from the U.S. Agency for International Development, the 3-year, \$1.45 million conservation project on the island's remote Masoala Peninsula will be one of the first of its kind ever attempted. Lowry says, "Our approach combines

the creation of a national park with local economic development. We're setting up an entirely new protected area of almost 1,200 square miles in which we can respond to the pressing needs of local residents, who often see conservation projects as threatening their very survival by placing land needed for agriculture off-limits."

Through improved land use and rural development programs, Lowry sees an alternative to the relentless clearing of the forest for cattle grazing, logging, farming and firewood. Instead, he sees opportunities to help people raise cash crops, such as rice, and to develop fishing, which is now an almost unexploited resource.

"Fortunately, the government of Madagascar has acknowledged the problem and has been very supportive of initiatives to preserve the country's biodiversity. . . The government sees the park as an example of how a developing country can build a modest but effective educational institution."

"Animal Rights," Animal Research, & Human Responsibility

by Dr. William T. Greenough, professor of Psychology and Cell & Structural Biology

The meaning of "animal rights" is probably unclear to many people. To those who coined the term, it means we should not require anything of animals that we would not also require of humans. Animal rights activists have been most vocal, however, about using animals in research.

"Animal rights" groups emphasize three arguments. The first concludes that animal research is immoral, regardless of the benefits. The second is that animal research has no value to treating human disorders. And third, research is unacceptably cruel.

The Animal Rights Philosophy

The arguments of Peter Singer and Thomas Regan conclude that animal and human lives are equivalent and, therefore, they have equivalent "rights." Singer argues that "sentience," the ability to perceive pain, is the quality of life that determines equality among species. "If the experimenters would not be prepared to use a human infant, then their readiness to use nonhuman animals reveals an unjustifiable form of discrimination," Singer asserts. (Substitute "eat" for "use" and "beef" for "nonhuman animals" for another perspective on this position.) They assert that there is no logical basis for considering humans to be different from other animals. They conclude that, if the only justification is one of species, this is "speciesism," the moral equivalent of racism.

In contrast, philosopher Carl Cohen contends that "rights" implies the capacity for moral judgment, a uniquely human virtue.

Concern for Animal Welfare

While most people reject the extreme animal *rights* position, they are concerned about animal *welfare*, feeling that animals should not be subjected to unwarranted pain or suffering. These feelings are exploited to attract donors to organizations such as the Antivivisection

Society and People for the Ethical Treatment of Animals (PETA). Most of us have an emotional reaction to suffering by either humans or animals. The literature distributed by such groups takes full advantage of this, displaying "evidence" of abuse of research animals ranging from decades-old photographs of mysterious origin to newer ones, some alleged to have been set up by animal rights advocates themselves. They imply that animal research is invariably cruel and that scientists either cannot or will not make it otherwise.

There is no question that research causes some pain to some animals or that laboratory conditions are inferior to those of many pets. However, it is just not true that laboratory conditions in general are cruel or even uncomfortable for most research animals.

Strict federal animal welfare regulations specify housing and care procedures and mandate review of every experiment involving vertebrates by a committee composed of university personnel and community representatives. (Currently, about 90% of biomedical research animals are rodents, typically rats or mice. Less than 2% of biomedical research uses dogs and cats. For every dog killed in research, more than 100 die in animal shelters.)

More important than regulations, it is just plain *bad science* to cause pain to one's animal subjects. Pain and other forms of stress alter the body's physiology. The pituitary-adrenal stress response, elevating blood glucocorticoids, has widespread effects on other physiological systems. Some, like the immune system, may weaken in response to stress. Other systems may alter their metabolism to optimize stress resistance. The stressed subject has an abnormal physiology, increasing the risk that results will be abnormal.

Most animal experiments involve

no significant pain. Typically, anesthetic and analgesic drugs are administered when procedures such as surgery are necessary. In short, the gruesome photographs presented by animal rightists grossly misrepresent animal research.

The Value of Animal Research

Animal rights advocates argue that animals are too different from humans for the results to be useful, that most biomedical animal research does not target specific diseases, and that alternatives could take the place of animal research. Life Science graduates know better.

Finding or developing an animal model for a disease can be extremely difficult. Some of the most widespread and debilitating human diseases, such as Alzheimer's senile dementia and schizophrenia don't occur or can't be identified in animals. AIDS infects only humans and other great apes. In contrast, animal models are an excellent source of fundamental knowledge. Most fundamental cellular processes are similar across species. Regulation of gene expression, mechanisms of the nerve action potential, and macromolecules that govern these processes have been highly conserved in evolution.

The goal of human disease research is to select the species that most closely approximates the biological function that one wants to study in humans. The broader goal of basic biological research is to discover fundamental principles that characterize a wide range of species.

With regard to computer models, the mathematical model is a formalized theory to be tested by experiment, not a description of a system that requires no further research. But for a simpler argument: We know more about how airplanes fly than we do about how most drugs work. Most airplane designs arise through computer models. But would you fly on an airplane designed on a

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"Animal Rights," Animal Research, & Human Responsibility

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computer and never tested? You would be taking a far greater chance with an untested computer-bred drug.

Animal Research & Human Disease

The greatest biomedical advances typically do not emerge directly from attempts to understand specific diseases or disorders. Biomedical research has progressed because we have developed a significant understanding of living systems. Researchers have recently discovered the location of the gene for "Woody Guthrie," or Huntington's, disease. This progress depended directly upon basic research.

Animal rightists have been particularly deceptive with regard to disease. By focusing on a few select examples and ignoring essential facts, they create the impression that animal research has been irrelevant to medicine. One case they cite is penicillin, a fungus discovered by Alexander Fleming in a petri dish without the use of multicellular animals. What they conveniently ignore is that the Oxford research team of Ernst Chain and Howard Florey then used animals to assess the safety and dose effectiveness of penicillin before it was tried in humans. Not to do so would have meant unnecessarily risking the lives of the first human patients. Most things that are toxic to bacteria are also toxic to humans. Animal models won't yield the exact human treatment, but they usually get close enough to minimize the loss of human life.

The list of biomedical advances in which animal research has played a fundamental role is very long. To deny this is to deny the history of 20th century medicine. A few examples from an AMA report:

—Diabetes. There is not yet a *cure* for insulin deficiency diabetes. The treatment, the pancreatic hormone insulin, was discovered in dogs. Prior to its discovery, even with heroic dietary measures, few diabetics survived their 20's.

—Surgery. Most forms of surgery were initially developed in animals, including many used on pets and farm animals. Heart surgical techniques such as bypass and transplant operations were developed largely using dogs. Similarly, immunosuppressive drugs, tissue matching procedures, and ancillary apparatus (e.g., artificial hearts) required animal research.

—Cancer. The mechanisms underlying most cancers are not yet fully understood. Both the tools for understanding cancer's actions on gene regulation and most current treatments—surgery, radiation therapy, and chemotherapy—were developed through animal research.

—Infectious diseases. Polio, tetanus, diphtheria, and whooping cough are now virtually unknown, thanks to vaccines in which animal research played an essential role.

—Brain and other neurological disorders. Studies localizing brain functions and guiding neurosurgical techniques, therapy for stroke and neurological disorders, and treatments to minimize acute effects of accidental neural trauma have used behavioral techniques on animals.

—Psychiatric disorders. Drugs used to treat depression, schizophrenia, and other forms of mental illness have depended heavily on both behavioral and neurophysiological research using animals.

This list ignores anesthetics, epilepsy, genetic disorders, sensory impairment, artificial limbs and joints, autoimmune diseases, nutrition, disorders of aging, lung disease, reproductive disorders, prosthetics, and a host of other areas in which animal research has contributed in an irreplaceable way to clinical medical treatments.

Tissue Culture & In Vitro Methods

Tissue culture and related *in vitro* methods, provide powerful research tools because they allow us to isolate a

system of interest from the effects of other systems in the body. One might, for example, assess the effects of various substances on the excitability of cultured heart cells in the absence of all of the circulatory and neural substances that influence heart cells in the body. This is designed to elude the complexities of the tissue's normal environment.

However, for most problems, the reactions of organs within the body is what is important. The effects of a drug on the heart may vary considerably in the presence of the autonomic nervous system and the many other substances that normally act on it. Recently it was shown that the anti-cancer effects of a drug *in vitro* disappeared when tested on tumors in the body.

Moreover, many diseases and many biological processes simply cannot be examined in isolated preparations. Diseases, such as multiple sclerosis and Lou Gehrig's disease, involve the immune system attacking other parts of the body. Questions about mental disorders such as retardation, depression, and schizophrenia ultimately require an intact, behaving brain to be studied.

Costs of the Animal Rights Movement

There are other hidden costs of the animal rights movement. As some terrorist break-ins have involved student volunteers, many faculty no longer allow undergraduates in their laboratories. This harms undergraduate education. Moreover, research on environmental issues and other critical fronts have also been impeded. Three economically important areas in which the U.S. has unquestioned scientific leadership are biomedical research, biotechnology, and agriculture. All are threatened by the animal rights movement. But by far the most important cost is the reduced progress of biomedical animal research. ♦

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Upcoming Events

On April 16, 4:00 p.m.—

Dr. Wendell Roelofs, Liberty Hyde Bailey Professor of Insect Biochemistry, Department of Entomology, Cornell University, will present the Seventh Annual Procter and Gamble Lecture on *The Genetics and Evolution of Chemical Communication in Moths*. The lecture will be in the Medical Sciences Auditorium, 506 South Mathews, Urbana, IL.

Dr. Roelofs, a member of the National Academy of Sciences and the American Academy of Arts and Sciences, and the 1990 winner of the Silver Medal of the International Society of Chemical Ecology, is known worldwide for his pioneering work in chemical communication in insects.

On September 14, 3:00 p.m.—

Dr. Charles Stevens, Director of the Neurobiology Section at the Salk Institute in San Diego, will present the Second Annual Hong Lecture on *Ion Channel Structure and Function*. The lecture will be held in the Medical Sciences Auditorium, 506 South Mathews, Urbana, IL.

Dr. Stevens was Professor and Chairman of the Section of Molecular Neurobiology at Yale University School of Medicine for many years. He is a member of the National Academy of Sciences and is an internationally recognized authority in the field of cellular and molecular neurophysiology. ♦

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SOLS Annual Fund Drive

If you are a SOLS graduate degree holder, you will be receiving a phone call from a student in Liberal Arts and Sciences in early April asking you to contribute to the Second Annual SOLS Fund Drive. Last year, our alumni contributed over \$9,000 to either the biology library endowment or the general SOLS enhancement fund. Contributions will again be solicited for these two funds.

Betty Davis, biology librarian, stated that last year's annual fund drive "allowed us to acquire books that we could not afford without cancelling additional journal titles. Moreover, 99% of these [book] titles are unique to the Urbana-Champaign campus, and so one copy of each book must serve the needs of *all* biologists on campus."

Books ordered include:

Biological Effects of Heavy Metals
Biology of Mammalian Germ Cell Mutagenesis
Bryophyte Development: Physiology and Biochemistry
Butterflies of Nepal (Central Himalaya)
Cancer and Aging
Causes and Consequences of Variation in Growth Rate and Productivity of Higher Plants
Cell Death, Mechanisms of Acute and Lethal Cell Injury
Cellular Antioxidant Defense Mechanisms
CRC Handbook of Insect Pheromones and Sex Attractants
Crystallization of Molecular Proteins
Encyclopedia of Human Biology
Gene Transfer and Expression: A Laboratory Manual
The Healing Forest: Medicinal and Toxic Plants of Northwest Amazonia
Human Nervous System
Laboratory Methods in Immunology
Ligands, Receptors and Signal

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Malignant Cell Secretion
Mechanisms of Differentiation
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Methods in Phytobacteriology
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Ribosome: Structure, Function and Evolution
A Study of Enzymes
Sulfur Nutrition and Sulfur Assimilation in Higher Plants
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Tissue Specific Gene Expression
Transfer RNAs and Other Soluble RNAs
Transformation of Human Diploid Fibroblasts: Molecular and Genetic Mechanics
Vision and the Brain: The Organization of the Central Visual System

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School of Life Sciences

alumni newsletter

fall 1991

Computers, Multimedia, & Curriculum: Not Just Another Agar Plate

Computers are making ever increasing inroads into higher education and curriculum development. Although there is still the cliché image of a professor scribbling diagrams on chalkboards while dutiful students take notes, more and more Life Science classes are being presented with the help of computer technologies.

With many technological advances and new capabilities, such as multimedia, simulations, and networking, and broader, more creative instructional applications, SOLS instructors are increasing the use of computers to enhance their teaching and perhaps, more importantly, to involve students actively in problem solving activities.

The first major effort to incorporate computer software (programs) into the general education curriculum began in 1989, when Ed Dole, teaching specialist in Plant Biology, used computer models in his lecture and discussions in Plant Biology 102. In 1990, Dole and George Kieffer, associate professor of Ecol-

ogy, Ethology & Evolution, introduced computer software they had developed into Biology 101. Using an "Integrated Teaching System," they employed multimedia—audio, video, and computer—technologies in creative ways during lectures. For example, a video microscope projects images of a plant's internal anatomy onto a large screen. Student

response to such new techniques has been very favorable.

However, to actively involve students in critical thinking and problem solving, individuals or small groups need hands-on use of computers in connection with laboratory experimentation. Computers allow students to experience and develop a more intuitive grasp of the dynamic

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Photo by Bill Wiegand

Ed Dole using a video microscope to project images of a plant's internal anatomy.

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The Director's Perspective

We approach the 1992 spring semester with eager anticipation. After nearly two years of planning, the School of Life Sciences will implement a totally revised core undergraduate curriculum. The sequence will consist of three semester-long courses with laboratories and will form the basis for introducing 1,800 undergraduate life sciences majors to the basic principles of biology. It is upon this base they will proceed to more specialized biology courses.

Computers, Multimedia, & Curriculum

(continued from page 1)

processes of the life sciences, something which is difficult to convey in traditional lectures.

To help accomplish these goals, the University of Illinois and Apple Computer Corp. entered into a joint agreement, called the Apple Core Awards. Faculty wrote proposals on how they would structure computer labs using the Macintosh platform. A subcommittee of UIUC's Education Technologies Board allocated the awards. Of nine proposals funded, SOLS received three.

Dole and Kieffer received an award to help revise the laboratory portion of Biology 101. For example, a genetic lab will integrate small-group problem solving, interaction with real populations, interactive computer simulations of meiosis, Mendelian genetics, and statistical analysis of data generated by the modeling programs. These new laboratories are being implemented this fall.

Carl Malmgren, teaching specialist, and Philip Best, associate professor, of Physiology & Biophysics will use their award to provide undergraduates enrolled in Physiology 101, 103, and 199 with an enhanced learning environment by adopting computer-based data acquisition and analysis methods in a physiology laboratory setting.

John Zehr, former head of

Physiology & Biophysics said, "Teaching of modern physiological concepts relies heavily on quantitative approaches.... With the adoption of computer-based data acquisition, students will be exposed to rigorous quantitative analytical procedures, including simple statistical analysis and graphical representation of experimental results."

This experience will provide students, especially those taking the laboratories for general education credit, with a friendly arena to gain an appreciation of the power of modern computational methods in biological research.

The third award was received by Sondra Lazarowitz and Stanley Maloy, associate professors of Microbiology. They are actively developing software on DNA technology and molecular genetics to supplement lecture and classroom microbiology courses. They also plan to use the computer facility for informal student orientation, training in laboratory safety, and background instruction to supplement deficiencies in a student's background.

Computers have become an integral part of research in the biological sciences in the last decade. And learning to use computers to solve problems is now becoming an essential part of the training students receive in the life sciences. ♦

The revised curriculum is much more than the usual annual updating and reorganization of lecture and laboratory materials. Rather, we will be offering biology in a new way. Students will be introduced to genetics and evolution as freshmen in their very first biology course—*Genetics & the Evolution of Diversity*. Traditionally, these topics have been presented much later. This course will be followed by *The Organism & the Environment* and *Molecular & Cell Biology*. Thus, molecular aspects of biology will only be introduced after students gain an overall appreciation of evolution and biological diversity. This approach is in contrast to the current trend in biology teaching, which introduces students to molecular biology in such a way that many gain little appreciation of the connections between molecular aspects of biology and the organism, evolution, and ecology.

Development of this curriculum has required hard work by over twenty dedicated and committed members of the School. It has also required new resources for the renovation of lecture and teaching laboratory spaces, purchase of new equipment and computers, and an adequate number of teaching assistants and other support staff. In spite of a very tight budget year, we have garnered the necessary resources and attracted funds from the Howard Hughes Medical Institute, the campus, and Apple Computer Corp. to achieve our goal of making undergraduate education a very high priority for the School of Life Sciences.

—Jordan Konisky, Director

Newly discovered 'soldier bees' defend against intruders

by Larry Bernard

Honeybees are known to divide their labor among specialized groups: foragers, nurses, guards, undertakers, food storers, and cell cleaners, among others.

Now, researchers have identified yet another profession in a honeybee colony—the soldier.

"Soldier bees come to the defense of the colony when the nest is disturbed, flying away from the colony to attack an intruder, and appear to have no other obvious speciality," said Gene E. Robinson, assistant professor of Entomology. With colleagues Michael D. Breed, University of Colorado, and Robert E. Page, Jr., University of California at Davis, Robinson made the discovery and presented the findings in the journal *Behavioral Ecology and Sociobiology* (December).

"This clearly shows there is a division of labor for defense. The defensive response of a colony is more structured than we thought."

It is well known that honeybees respond to a disturbance by stinging. Entomologists thought this was done by the older bees in the colony, those that normally serve as foragers.

Robinson and colleagues disturbed honeybee colonies and captured the first bees to fly off to attack an intruder. They compared wing wear from the soldiers and from foragers and found that, while they were of similar age, the soldiers were flying much less.



Photo by Bill Wiegand

Gene Robinson looks inside a honeybee colony on the U. of I.'s South Farms.

"As with humans, soldiers don't have much to do unless there's an attack," Robinson said. "They hunker down and wait. That may be what these soldier bees are doing."

The researchers also determined that the soldier bees were genetically distinct from foraging bees by comparing the frequency of biochemical genetic markers.

"They are behaviorally and genetically a select group. We know they are not foragers or guard bees. But we don't know what other role they may have in the colony."

Other insect societies, such as ants and termites, have soldiers, but this research shows for the first time a distinct group of soldier honeybees.

This newly found specialty may help explain the behavior of Africanized bees, which recently have

moved into southern Texas. African bees are more aggressive than the European honeybees common in North America, and are prone to mass stings.

"Perhaps colonies of Africanized bees contain a higher proportion of soldiers, or they are better at recruiting other bees as soldiers. Or maybe they don't have this type of social organization at all, and all bees can respond to a disturbance. This discovery now gives us a framework with which to do detailed studies of defensive behavior."

Robinson teaches introductory entomology to undergraduates and plans to offer a course on social insects, especially the honeybee. ♦

—Courtesy of *Inside Illinois*

Faculty Updates

William T. Greenough, professor of Psychology and Cell & Structural Biology, was elected vice president and member of the executive council of the Federation for Behavioral, Psychological & Cognitive Sciences. The Washington, D.C.-based educational organization coordinates the efforts of its 17 member scientific societies in communicating opportunities and potential of behavioral science research to government officials and addresses problems of interaction between governmental agencies and research scientists.

Lowell L. Getz, professor of Ecology, Ethology & Evolution, was named head of the department in May. He has been Acting Head since 1988.

George H. Kieffer, associate professor of Ecology, Ethology & Evolution, received the Excellence in Off-Campus Teaching Award for 1990-91. These awards were initiated by the University to recognize the special skills and attitudes that outstanding teachers bring to off-campus courses and degree programs.

Robert L. Metcalf, professor emeritus of Entomology and Biology, was awarded an honorary doctorate of science from The Ohio State University on March 22. The conferring statement read in part, "An acclaimed researcher, concerned environmentalist and revered teacher, Robert L. Metcalf is internationally recognized for his work in entomology and toxicology.... His pioneering studies on environmental toxicology and plant/insect co-evolution have yielded exceptional advances in the ways science safely serves mankind."

Thomas Uzzell, associate professor of Ecology, Ethology & Evolution, ended his service as Director of the Natural History Museum on August 21.

He will be on sabbatical leave at Washington University School of Medicine, St. Louis, during the 1991-92 academic year, working on preliminary physical mapping of the frog genome. Dr. Uzzell was director of the Museum for 5 years.

John S. Willis, professor of Physiology, retired in February. In August, he became a professor in Zoology at the University of Georgia, Athens. **Judith H. Willis**, professor of Entomology, also retired and assumed duties as head of Zoology at the University of Georgia.

Ralph S. Wolfe was granted professor emeritus standing in Microbiology. He plans to continue his research on the biochemistry of methanogens.

John E. Zehr, head of Physiology & Biophysics, became the tenth president of Bethel College, a private, 4-year liberal arts college in Kansas in August. Dr. Zehr came to the University of Illinois in 1972 and had been department head since 1988. **Dennis E. Buetow** was named acting head for the fall semester. ♦



Helen Hess Honored

At the School of Life Sciences' annual awards reception in May, Director Jordan Konisky announced that the School of Life Sciences is establishing the Helen E. Hess Award in honor of her 22+ years of service and commitment to our undergraduate program. She retired in August.

Ms. Hess served as Assistant Director for Academic Affairs since 1969. As an academic advisor, she advised approximately 34,000 life science undergraduates. One of her most rewarding experiences was working with the Undergraduate Student Advisers, a program she developed in which SOLS undergraduates are trained to counsel other SOLS students.

Lauterbur Heads New National Center

The University of Illinois will be home to a new national center in magnetic resonance imaging technology under a \$10.6 million grant awarded by the National Science Foundation—and the only one of its kind to be devoted to biological research.

Magnetic resonance imaging, based on nuclear magnetic resonance, uses a magnetic field and radio frequency to create images of the inside of the body. The Center's primary focus will be coordinated studies of brain anatomy, chemistry, function, and behavior, with a secondary focus on the physiological integration of the brain and body. The work eventually could be

applied to diagnosing and treating such brain disorders as Alzheimer's disease and stroke.

Paul Lauterbur, professor of Medical Information Science, Chemistry, Bioengineering, and Physiology & Biophysics, is director of the center. He pioneered development of magnetic resonance imaging and its use with spectroscopy, which allows researchers to watch brain function as it occurs. He said, "The images will be at least as good as naked eye anatomy, but you don't have to slice open a brain to see it.... You can see smaller structures, with more sensitivity, in less time than with conventional imaging instruments."

The facilities will be housed at

the Beckman Institute. The Texas Accelerator Center will build the superferic 4-tesla magnet, which will be about three times stronger than those used in standard clinical settings. This strong magnetic field, which would extend a great distance and interfere with nearby electronic equipment, will be contained by a shield of 100 tons of iron.

More than 30 University faculty members are participating in the center, including M. Joan Dawson, associate professor of Physiology & Biophysics, Emanuel Donchin, professor of Psychology and Physiology, and William T. Greenough, professor of Psychology and Cell & Structural Biology. ♦

Fire Damages Natural History Building

A three-hour fire on Feb. 26 caused an estimated \$2 million damage to the Natural History Building. But it could have been much worse.

Fire and water damage was largely limited to the northern third of the building, closing some classrooms, laboratories, and offices. The Department of Geology suffered extensive damage to physical facilities, computer and lab equipment, personal libraries, and research data, but the geology library escaped damage.

The Natural History Museum's and the Herbarium's collections were undamaged. The only damage

reported to the collections was to the bison on the second floor, which was "wading" in water.

The U. of I. fire department was called after a smoke odor was noticed on the fourth floor of the building. Urbana, Champaign, and Chanute Air Force Base departments were soon called to help.

The fire apparently started as university workers, who were doing remodeling work on the fifth floor, used a cutting torch to remove steel rods that held up a sprinkler system. The fire quickly spread through the wooden joists and the ceiling.

The collapse of a section of the fifth-floor ceiling on three firemen

was a "scary point," according to U. of I.'s Battalion Chief Neal Bollman, but it actually gave the firemen better access to the major part of the fire. Two firemen sustained minor injuries.

The Natural History Building, designed by U. of I. architect Nathan Ricker and completed in 1892, is on the National Register of Historic Places; it houses more than 450,000 specimens and more than 1,000 people work or attend classes in the building. Ironically, some of the labs most heavily damaged had just been remodeled. ♦

Contributors

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Mary E. Krisko
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Thanks to all our alumni and corporate sponsors who made this year's annual fund drive an overwhelming success!

With economic uncertainties during planning stages of this campaign, we decided to maintain our goal of raising \$10,000. By August, we had received contributions of \$15,870—159% of our goal. The funds were designated as follows:

School of Life Sciences	
Enhancement Fund	\$4,780
Biology Library	
Endowment	\$7,670
Designated gifts, Liberal Arts & Sciences	
Annual Fund	\$3,420

Last year we set a goal of raising \$10,000 for the Biology Library in a three-year period. We have now raised almost \$15,000—and just two years into the campaign.

Many people are unaware that the University of Illinois is a *state-assisted*, not a state-supported, university. Only 42% of our operating budget comes from the state, according to the University of Illinois Foundation. Student fees and tuition provide approximately another 8% of the budget. Therefore, 50% of our yearly funding must come from outside sources, including private gifts.

Private support provides the extra edge, the increased margin of excellence. In real terms, private support provides programs and facilities that would not be available through state-funding alone. ♦

Alumni News

1940s...

Jane C. Dirks-Edmunds (Ph.D. Zoology '41) retired and was granted emeritus status in 1974 after serving 33 years as a biology professor at Linfield College, McMinnville, OR. She is writing a book based on her experiences in the ecology of two Douglas-fir forests: the old-growth community and the second-growth community at the same site 20 years after logging.

Charles M. Vaughn, Ph.D., (B.A., '39; M.A. Zoology '40) is National President of Phi Sigma (National Bio-logical Sciences Honor Society), an office he has held since 1983. He is also Professor Emeritus of Zoology and Parasitology, Miami University, Oxford, OH.

1960s...

Jacques Berger (M.S. '58, Ph.D. Zoology '64) is a professor of zoology at the University of Toronto, Toronto, Ontario, Canada, where he is working on the microbial ecology of oil spills and the history of protozoology.

Neil G. Grant, Ph.D., (B.S. Botany '61) was a guest lecturer on algal respiration and algal biotechnology at Nanjing University, Nanjing, People's Republic of China, in April 1991. He also has been active in establishing an innovative combined B.S./M.S. program in biotechnology at William Paterson College, Wayne, NJ, where he has been an associate professor of biology since 1977.

1970s...

Gary J. Boch (B.S. Microbiology '76) is national sales manager for

molecular biology, immunology, and cell biology products, Industrial Bioproducts Division, GIBCO BRL Life Technologies, Inc., Grand Island, NY.

Grace C. (Yu) Chow (M.S. Zoology '70) is a research scientist in the Department of Immunology, Research & Development Center, Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT.

Dr. Mark James, Teacher of the Year

After only two years at the Tulane School of Public Health and Tropical Medicine [New Orleans, LA], Dr. Mark James (M.S. '75, Ph.D. Zoology '79) received the Excellence in Teaching award last May [1990]. Enrollment for his class has increased more than 50% from 18 to 28 students, a significant jump for a specialty course like immunology.

Dr. James' first premise in teaching is to be prepared. "Students shouldn't put in any more effort than the teachers," he said. Dr. James presents information in bite-size pieces. "He makes you understand. It's logical," said a tropical medicine student.

"Immunology is a topic that impacts on all aspects of public health," he said. "Students in environmental health and epidemiology are recognizing the importance of immunology."

Dr. James first became interested in tropical medicine as an undergraduate student at the University of Wisconsin. Working toward a Master's at the University of Illinois, his interest in immunology blossomed. He continued there with his doctorate, working on malaria in mice.

Dr. James was a teaching assistant in immunology and parasitology for seven semesters while at Illinois. From this experience grew both an increased interest in immunology and a desire to teach. He continued at Illinois following his doctorate, first as a research assistant and then as a visiting professor. During that time he worked on a collaborative project in Venezuela and later served as a member of the USAID malaria program involved in developing a malaria vaccine. Dr. James stayed at Illinois until 1988, when he joined Tulane.

Dr. James joined the Tulane malaria team along with Dr. Mark Wiser, a molecular biologist, and Dr. Norbert Lanners from the Primate Center in Covington. Dr. James is involved in two areas of the immunology of malaria—the development of an antimalarial vaccine and the development of improved early diagnostic testing for use in developing countries.

Dr. James has high hopes for his work with the malaria team. A new antigen has been found that could develop into a good vaccine candidate. Grant proposals have been submitted for testing the vaccine at the Delta Primate Center.

A simple, adaptable, and affordable diagnostic test is currently undergoing preliminary testing in Honduras. Depending on the results of these experiments and others in Venezuela and Brazil, the malaria team will apply for additional funding for testing elsewhere.

—Excerpts from an article by Lisanne Brown, Tulane School of Public Health & Tropical Medicine Newsletter, Fall 1990

Mark Thomas Kopeny, Ph.D., (B.S. Ecology, Ethology & Evolution '79) is a wildlife biologist for the Florida Game and Freshwater Fish Commission, Tallahassee.

Anne Ritke McCall, M.D., (B.S. Biology '78) is an assistant professor in radiation oncology at Loyola University Medical Center, Maywood, IL. Her interests include breast and gynecologic cancers. She was recently a guest speaker on CRIS radio, discussing the treatment of early breast cancer.

Ann McGee (B.S. Botany '77) was awarded her Ph.D. in forestry in 1988 and is working as a consultant in New Westminster, British Columbia, Canada.

Stephen R. Ortman (B.S. Biology '74) is a buyer for Motorola Cellular Drop Ship. He is also a volunteer at the Spring Valley Nature Sanctuary in Schaumburg, IL.

Adolfo Molina-Pardo (M.S. '69, Ph.D. Entomology '73) is back at the National University of Colombia, Medellín, as an Associate Professor after completing a 3.5-year leave to work in El Salvador, Central America, for the Organización Internacional Regional de Sanidad Agropecuaria as head of the BID/OIRSA Africanized Honey Bee Program.

Dale Simon (M.S. Biology Education '72) is a biology and 7th grade life science teacher at Central Junior/Senior High School, Camp Point, IL.

1980s...

Steven P. Allen (B.S. Microbiology '80) received his Ph.D. degree in October 1990 in the Department of Food



Photo by Champaign-Urbana News Gazette

*In May, **David M. Stone** (M.S. Entomology '84) was awarded \$2,500 for teaching excellence by Tandy Corp.'s Tandy Technology Scholars Program. This national program recognizes outstanding students and teachers in mathematics, sciences, and computer science. He was also one of eight teachers honored in Washington, D.C., as National Press Conference award recipients. Mr. Stone teaches introductory biology and chemistry at University High School in Urbana, IL, and has developed an advanced biology course. He is pictured with students Andrea Peck and Mindy Foland.*

Science (Microbiology Group) at the University of Illinois. He is currently a postdoctoral associate at Monsanto in St. Louis, MO, working with their protein biochemistry/gene expression group.

Paul Arquilla (B.S. Biology '88) is a third-year student at the Illinois College of Optometry in Chicago. He will graduate in May 1992.

Pamela J. Baxter, M.S., (B.S. Genetics & Development '85) is a Ph.D. student in chemistry at the University of Washington, Seattle.

David A. Brenningmeyer, M.S., (B.S. Biology '86), a second-year law student at the University of Maine, Portland, was named to the Dean's List and is the recipient of the Israel Bernstein Scholarship. He is also a legal writing instructor, a staff member of the Maine Law Review, and a legal researcher for Maine Public Utilities Commission, Augusta.

Howard B. Chodash, M.D., (B.S. Physiology '84) completed his internal medicine residency in June 1991 and began a year as chief resident at the Mayo Clinic, Rochester, MN. He is currently serving on the American

Medical Association's Council on Medical Education.

Carrie Coles, P.T., (B.S. Physiology '86) is a staff physical therapist at O'Donoghue Rehabilitation Institute, Oklahoma City, specializing in stroke and spinal cord injury. About the last alumni newsletter she said, "Thanks for Dr. Greenough's *Animal Rights* piece—it was the best written pro-biomedical animal research argument I've seen. Without this research, I believe the majority of my patients would not have survived to face the challenges of today!"

Wendy A. Havelka (B.S. Microbiology '85, M.S. Biology '88) recently completed her research and doctoral degree at the University of Oxford as a Leverhulme Scholar. She is now pursuing a post-doctoral research position at the Max Planck Institut, München, Germany, on rhodopsin structure and function using x-ray crystallographic techniques.

Marlene C. Harshfield Hogue, M.S., (B.S. Biology '81) is a plant and pesticide specialist for the Illinois Department of Agriculture, Morris, IL.

Debra A. Levinthal, D.P.M., (B.S. Biology '87) graduated in May 1991 with honors from Wm. M. Scholl College of Podiatric Medicine. In June she began a 2-year surgical residency in Los Angeles at Hawthorne Hospital and in Mexico at Baja Crippled Children's Center. She was nominated for the latest edition of *Outstanding Young Women of America*.

Jeanne McElligott (B.S. Biology '88) is attending physical therapy school at the University of Illinois, Chicago.

David L. Monti (B.S. Ecology, Ethology & Evolution '89) is in the Masters education program at St.

Xavier's College, Chicago, and will be certified to teach secondary school biology. He plans on teaching and getting a Ph.D. in marine mammalogy behavior. He completed a research internship for The Whale Museum in Friday Harbor, WA, in December 1989.

Donna Scully Norder, O.D., (B.S. Biology '87) graduated valedictorian of the 1991 class of the Illinois College of Optometry, Chicago, on May 19. She will be joining the Family Eye Care Associates, with offices in Homewood, Blue Island, and Chicago Heights, IL.

Dan M. Podeschi, M.D., (B.S. Biology '85) is a second-year resident in anesthesiology at the University of North Carolina, Chapel Hill.

Stephen L. Raben, M.D., (B.S. Biology '85) is a first-year resident in family practice at Southern Illinois University, Belleville. He is married to Nancy (Fillingim) Raben, who is a graduate of the U. of I.'s College of Education with a B.S. in Mathematics ('87), and they have a son, Joshua Stephen, born in December 1990.

John K. Richard (B.S. Biology '82) is manager of Computer Corner, the campus reseller to departments, faculty, staff, and students of current microcomputer technology, at Southern Methodist University, Dallas, TX.

George Ilija Sreckovic, M.D., (B.S. Biology '86) is a resident physician in urology at St. Louis University Hospital, St. Louis, MO.

Frances J. Wildman (B.S. Ecology, Ethology & Evolution '80) is a physical scientist in the Science and Engineering Department, Rock Island Arsenal (IL). She is the hazardous waste manager for over 100 waste streams on the island. She is married and has two children.

Lori Wollerman (B.S. Biology '88) is a Ph.D. student in behavioral ecology at the University of North Carolina at Chapel Hill. She is studying acoustic communication and sexual selection in hylid frogs. In her letter she said, "I was quite excited upon receiving the Spring 1991 issue of the newsletter to learn that Illinois has renewed its acquaintance with the Organization for Tropical Studies.... Last summer I participated in the OTS course Tropical Biology: An Ecological Approach. My tropical experience was stimulating, fun, strenuous, and sometimes difficult, but incredibly rewarding. The courses are coordinated by some of the best scientists doing work in the tropics who are also excellent naturalists and teachers. The courses are organized, well planned, and executed. I was very happy to see that the University has realized the unique opportunities membership in OTS offers, especially through courses and fellowships for graduate students. I hope they take advantage of these opportunities."

1990s...

Charles W. Bemm (B.S. Biology '91) was one of 15 winners nationwide of an Alpha Lambda Delta fellowship for graduate study during the 1991-92 academic year. He plans to pursue a medical degree.

Mary E. Prewitt (B.S. Plant Biology '91) was awarded a National Science Foundation Graduate Fellowship. She is pursuing her graduate degree at the University of Illinois. NSF awarded 950 fellowships out of 7,346 applicants, according to a news release.

Robyn Thomas (M.S. Education '91, B.S. Biology '91) earned a B.S. in biology, although never a declared major, while also obtaining a M.S. degree in education. ♦

In Memoriam

Maj. Thomas Koritz, M.D., (B.S. Biology '75) died Jan. 17, 1991, when his F-15E jet went down during a bombing mission in Iraq. Koritz attended Rockford Medical School and was commissioned as an Air Force pilot in 1980. He is survived by a wife and three sons.

Julie Stromley, a graduate student in Microbiology, died Feb. 23, 1991, of a rare sarcoma-type cancer. After graduating with a B.S. degree in microbiology from Iowa State University in 1987, she entered the University of Illinois to pursue a Master's degree. Her research field was microbial ecology, and she remained determined during her illness to earn her degree. On Feb. 22, the Graduate College presented a

special certificate to her in the hospital, recognizing her fulfillment of the degree requirements.

At the beginning of February, Stromley and her husband, David, went on a vacation to Colorado, fulfilling her longtime desire to see the mountains. Microbiology, through fund-raising efforts of students, faculty, and staff, made it possible for the Stromleys to spend a long weekend at a bed-and-breakfast inn in the heart of the Rockies.

Kelly Magnuson, a doctoral student in microbiology and co-organizer of the fund raising effort said of that effort, "For someone to go through what she's gone through the past two years, to have her do one thing she has really wanted to do seemed like such a trivial effort." ♦

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Comments and suggestions
are welcome and should be
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Additional Degree(s) _____

Current Activity/Employment _____

Board Approves Design of New Building

The Board of Trustees approved the design of the new Chemical & Life Sciences Laboratory by the architectural firm of Perkins & Will. The construction budget for the building, however, is currently frozen by the State.

The building, planned to contain about 271,000 gross square feet and about 127,000 net, is to be constructed on the west side of Goodwin Avenue, across from Krannert Center for the Performing Arts. It will sit on both sides of, and bridge, California Avenue. That block of California will be closed to traffic and turned into an extension of the mall running east from the Quad.

Cell & Structural Biology and Microbiology will be housed in the Life Sciences' portion of this new facility. ♦



Architect's rendering of the Chemical & Life Sciences Laboratory facing Goodwin Avenue. The entrance to the pedestrian walkway, created by closing California Avenue, is through the pillars on the right.

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School of Life Sciences

alumni newsletter

spring 1992

Computational Neuroscience — Exploring the Hidden Layer

Dr. Thomas J. Anastasio, one of the newest faculty members in Physiology & Biophysics, started his career in neurophysiology almost by accident. As a freshman entering McGill University, he had an advisor who sent all the “un-decideds” into Psychology.

However, Dr. Anastasio found he wasn't very interested in traditional psychology. Then one day he was introduced to a neurocircuit that described how pain worked and he was fascinated with how such an analytical approach could help in developing an understanding of behavior.

“Behavior, simply put, involves the reception of sensory input, the processing of the input, and then a response,” Dr. Anastasio said. Behavior may range from the fairly simple

knee-jerk response to complex, high levels that result in a masterpiece or a great work of literature.

Because the brain is too complex for anyone to study as a whole, the trick is to pick a small portion of the

brain and its behavior, and hope that what is learned in that one area may be applicable to other areas.

The behavior that he decided to study in his doctoral work at the Uni-

(continued on page 5)



Photo by Jim Corley, B & W Photo

Dr. Thomas Anastasio in his office at the Beckman Institute.

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The Director's Perspective

"...the next great step in undergraduate education will be based in computer networking."

Over the last two years, the School of Life Sciences has implemented a School-wide computer network system that links faculty, staff, and students electronically, to create a shared, collaborative environment. At present, almost 300 personal computers in faculty offices, research laboratories, administrative offices, service facilities, and classroom laboratories are linked to each other, and in most cases to the outside world. Many faculty now have an immediate electronic mail link to their colleagues throughout the U.S. and abroad and immediate access to a variety of national and international computer-based resources.

The SOLS computer network has had a major impact on instructional activities by providing the faculty with the means to develop and test computer-based instructional formats. Computer-assisted instruction has been incorporated into lecture and laboratory sections of Biology 120-122, our introductory biology sequence for majors (see Fall 1991 Alumni Newsletter). Exercises including computer-based data acquisition, simulation analysis, and database searching have been introduced into intermediate and advanced courses. Instructor-driven software formats pioneered by the Plant Biology Department are being used in small discussion sections as well as in moderate-sized lectures.

There is no doubt that the next great step in undergraduate education

will be based in computer networking. In the near future, I envisage a Life Sciences undergraduate major gazing at her computer screen as the events of mitosis, DNA replication, or fertilization unfolds before her in full color and in real time, delivered to her dormitory room desk top computer by a campus-wide network that links her to a SOLS file-server. I envisage another student using a statistical package from that same server as he works on a problem set in population biology. And yet another student reviews an image data base of colorful butterflies, flowers, molluscs, birds, and microbes.

I see a student in Urbana and one in Champaign viewing the same document simultaneously on their computer screens as they work together to perfect a well written lab report. Another student is linked to the SOLS protein structure data base and is learning about enzyme structure and function as the three-dimensional image of an enzyme in its full glory rotates on the screen showing off its structural attributes.

I imagine our 1,850 undergraduate majors, as well as the thousands of other undergraduates we serve, with free and full access to everything that our network can provide them. We, in SOLS, have begun to put in place a computer network that can make all this possible.

Jordan Konisky, Director

The Immune System Explained

Dr. Edward Voss, professor of Microbiology, attacked the human immune system during his Jubilee Lecture, rendering it understandable.

The immune system functions as a sophisticated surveillance system, Dr. Voss explained—"a constantly monitoring mechanism that protects us against a daily onslaught of spontaneously generated malignant cells and pathogenic organisms."

The immune system's primary job is to determine what is a natural part of the body and what is foreign, to "discriminate between self and non-self substances." When the immune system is working properly, a complex communication system alerts an army of lymphocytes to storm the foreign cells and annihilate them.

In a common cold, for example, macrophages—described as eating or destroying cells—attack the virus cells, breaking them into very small particles that are put onto the surface of the cell. "That's a signal to the T cells, which are 'educated' in the thymus gland, to come in and help—the first step in communication."

Next the T cells communicate with the B cells, which have matured in the bone marrow, to tell them to make antibody molecules. Then the T and B cells "secrete the antibodies that fight infection."

The immune system reaches peak efficiency during mid-life. However, at about age 50 it begins to wear down. The "switch" that distinguishes between good and bad cells can become "a little faulty." As a result, humans develop autoimmune and immune deficiency diseases.

In autoimmune diseases—of which there are about 40—a body produces

antibodies against itself. Autoimmune diseases include rheumatoid arthritis, diabetes, lupus, and myasthenia gravis. Some 10 million Americans are affected by these diseases, "and the number is growing every year," Dr. Voss said.

Lupus affects up to 750,000 people a year, mostly women. The incidence of lupus is highest in Scandinavian countries, and also among their descendants living here. Minneapolis-St. Paul, with its large Scandinavian population, has 4-5 times the national average number of lupus cases. "Such

"When that recognition system falters, then the net result is an autoimmune disease."

tracings of the disease indicate genetic or hereditary factors."

In the lab, Dr. Voss has been trying to determine if there is such a thing as an autoimmune gene or if there are many, and if they are normally present in all people. What he found for lupus is "not a single gene, but a family of genes." These studies have led the researchers to conclude that "we all have these genes."

Since the autoimmune antibody genes are present in all of us, then it is the control of their production that is the "critical factor," he said, adding that "the hereditary patterns may reflect problems in the control of regulatory mechanisms."

As a result of this recent work, he believes the thymus plays a critical role in the immune system's recognition and control mechanism.

"Scientists must now focus their attention on the factors involved in

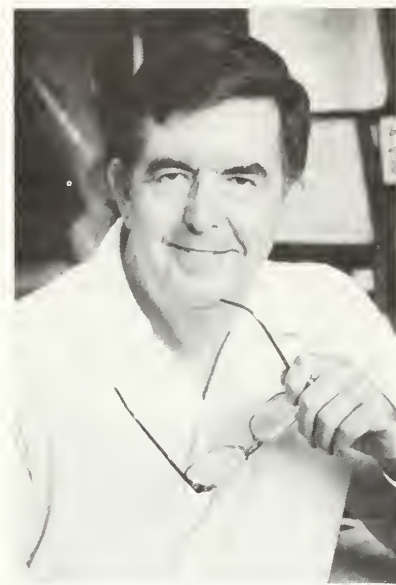


Photo by Jim Corley, B & W Photo

the 'sorting out' of lymphocytes that arise daily from the bone marrow. It is evident that autoimmune lymphocytes arise daily and are normally efficiently eliminated, perhaps in the thymus. When that recognition system falters, then the net result is an autoimmune disease."

In recognition of his contributions to the understanding of lupus, Dr. Voss was named to the National Lupus Hall of Fame in 1988.

The Jubilee Professorships were created in 1989 to celebrate the 75th anniversary of the College of Liberal Arts and Sciences and to honor selected faculty for their contributions to the academic life of the college through outstanding achievement in undergraduate education, research, and scholarship. ▼

—Excerpted from an article by Andrea Lynn, Science Writer, Inside Illinois

► faculty updates

Recently Ecology, Ethology & Evolution added five new affiliates from the Illinois Natural History Survey to their faculty: **Peter B. Bayley**, **Robert A. Herendeen**, and **Steven L. Kohler**, from the Center for Aquatic Ecology, and **Jeffrey D. Brawn** and **Edward Heske**, from the Center for Wildlife Ecology.

In August, **Jonathan Henry** joined the department of Cell & Structural Biology as an assistant professor. His research involves the mechanisms of cell determination and the development of the vertebrate lens.

Chris Q. Doe, assistant professor in Cell & Structural Biology, was awarded a Presidential Young Investigator sponsorship grant by Eli Lilly & Co.; this unrestricted grant will be used to support his research studies. He has also been invited to participate in the "Distinguished Visitor" Lecture Series at Singapore University in November.

The Neuroscience Program recently received a 5-year, \$3 million grant from the Lucille P. Markey Charitable Trust to study the molecular and cellular mechanisms of neural development and plasticity.

William T. Greenough, professor of Psychology said, "The Markey funds will enable us to build faculty strength in what is arguably the most exciting field of modern science."

The proposal was submitted by Theodore L. Brown, director of the Beckman Institute, **Albert S. Feng**, head of Physiology & Biophysics, **Robert L. Switzer**, head of Biochemistry, **Alan F. Horwitz**, head of Cell & Structural Biology, and Greenough.

Paul C. Lauterbur, professor of Medical Information Science, Chemistry, Biophysics, and Bioengineering, was one of six recipients of the 1992 Lincoln Laureate, Illinois' highest award. The award recognized his development of nuclear magnetic resonance imaging, which allows physicians to look inside the body and identify signs of serious illness without exposing the patient to radiation or surgery.

Albert S. Feng, professor of Physiology and Biophysics, was named head of the department of Physiology & Biophysics. He began his duties in January. He had been serving as associate director of the Beckman Institute.

Ralph S. Wolfe, professor of Microbiology, was awarded emeritus standing at a reception in his honor last fall. ▼

Dr. Stephen Downie Receives the Robert T. & Laura L. Fraley Young Faculty Award

*Director Jordan Konisky recently announced that **Stephen R. Downie** will receive the Robert T. & Laura L. Fraley Young Faculty Award. This award of \$7,000 will be used to help establish his research program in plant molecular biology.*

Dr. Downie recently joined the department of Plant Biology as an assistant professor. He received his Ph.D. from the University of Alberta in 1987 and completed a postdoctoral position at Indiana University before coming to UIUC.

In his research, he uses the record of molecular change contained within the chloroplast DNA molecule to trace evolutionary histories and to determine phylogenetic relationships among flowering plants.

To extract phylogenetic relationships, he uses three approaches: comparative restriction site mapping, DNA sequencing, and the distribution of major structural rearrangements (e.g., inversions, loss of genes). Of particular interest are the relationships of species in two large and economically important families of flowering plants, the Rosaceae (rose family) and Apiaceae (carrot family).

*This award was made possible by the generous gift of **Robert T. Fraley** (A.B. '74, M.S. '76, Ph.D. Microbiology '79), who is Vice-President, Technology, Monsanto World Headquarters, St. Louis, MO, and **Laura L. Fraley** (A.B. '77, M.S. Finance '79), who is Vice-President and Director of Trust Financial Services, Ralston Purina, St. Louis.*

Computational Neuroscience — Exploring the Hidden Layer

(continued from page 1)

versity of Texas, Galveston, and his postdoctoral studies at Johns Hopkins is called the vestibulo-ocular reflex (VOR). This reflex maintains visual stability during head movements—as the head rotates, the visual image stays relatively steady. This reflex has been studied by a number of scientists and is a behavior that is easily measured and readily accessible.

The reflex consists of three stages. First head rotation is sensed in the semicircular canals of the ear. The neurons process the input, sending information to the eye muscles to control the eye movement. This reflex can easily be observed behaviorally in two of the three stages—rotate the head, watch the eye movement. But what happens in that middle stage? How is the input processed in that “hidden layer” to become the desired output?

To begin addressing this question, Dr. Anastasio recorded the activity of single neurons using surgically implanted electrodes. He found that the neurons he was recording did not behave as predicted by simple analytical models. Whereas the reflex could be explained on paper by two

or three neurons, Dr. Anastasio and others found that perhaps 1,000 neurons may mediate VOR.

Although VOR is only one behavior associated with eye movement, brain regions that control eye movements are similar in that they all contain neurons with complex and highly variable behavior patterns. “Rather than falling into well defined functional groups, neurons in the same region appear to mix and match attributes, each making their own unique contribution to eye movement control.”

In other words, the behavior is very complex in that middle “hidden layer.” Using a talent for math, Dr. Anastasio developed a neural network model, also with three layers—input, processing, and output. To represent the abundance of neurons in the hidden processing layer, he used 40 elements in this neural network. But how do you arrange the elements? Through computation—using what is called a “back-propagation neural network learning algorithm” and a computer.

Basically, you train the neural network model. Given an input and a

desired response, the back-propagation algorithm is used to iteratively adjust the values so that the errors between the actual and calculated response are minimized. This is called error driven learning—making the 40 elements “learn” to give the desired result. And this model coincides well with the data collected through physiological studies.

The neural network model illustrates that the middle layer of neurons is one of coordinated diversity. “An analogy is that of a successful large company,” Dr. Anastasio explained. “A company has its inputs, with one being perhaps a production goal. Many individuals work to achieve that goal. Although no two are alike, yet they work together.” Such are the neurons that coordinate behavior.

But why thousands? No one knows for sure. Perhaps they add some redundancy to the system, so if something happens to one, the behavior continues without noticeable change.

Gaining such details will occupy Dr. Anastasio’s time for years to come. And he looks forward to it with enthusiasm. ▼

Neuroscience Program Now Degree Granting Unit

On September 4, 1991, the Illinois Board of Higher Education gave approval to the Neuroscience Program to grant the doctoral degree. Although the program was established in 1969, the degree conferred was a Ph.D. in Biology—now the diploma will read Neuroscience.

Neuroscience is an interdisciplinary,

interdepartmental graduate program whose goal is to produce scientists who are both technically competent and broadly educated in neurobiology. Currently 55 faculty members in 12 departments and 5 colleges and 32 graduate students participate in the program.

Research training is a vital part of

the program. Diverse experience is provided by research apprenticeships in two or three different laboratories during the student’s studies. Each student can explore several research areas to determine interests and to learn central questions and methodologies important in neurobiology. ▼

SOLS Enhancement Funds Advance Graduate Research

(continued from page 12)

week *Protein Characterization and Purification* course at Cold Spring Harbor Laboratory.

Also benefitting from an Enhancement Fund award is Mr. Stephen Harper, a graduate student working with Dr. George Batzli in Ecology, Ethology & Evolution. He is cur-

rently attending *Tropical Biology: An Ecological Approach*, a course taught at the Organization for Tropical Studies' facility in Costa Rica. The 2-month field course encourages a student's total immersion in tropical ecology and emphasizes how to do research on tropical organisms.

The School of Life Sciences Enhancement Fund is currently assisting graduate students by providing off-campus tuition for special courses. The fund is supported by the generous donations of our alumni during the SOLS Annual Fund Drive. ▼

Additional Contributors

Annual Fund Drive, School of Life Sciences, 1991

Contributions to the School of Life Sciences Enhancement Fund,
the Biology Library Endowment, or
designated gifts through the LAS Annual Fund Drive,
August 16-January 31, 1992

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If you are a SOLS graduate degree holder, you will be receiving a phone call from a student in Liberal Arts & Sciences in late March or early April asking you to contribute to the Third Annual SOLS Fund Drive.

Again we will be soliciting contributions for the Biology Library Endowment Fund and the SOLS Enhancement Fund.

*Please give generously.
Help us make a difference.*

► alumni news

1950s...

Arthur Myrberg, Ph.D., (M.S. Zoology '58) received a Ripon College (WI) Distinguished Alumnus Award in 1991. He is a professor of marine science at the Rosenstiel School of Marine Science at the University of Miami. His research areas include ethology, behavioral ecology, and bioacoustics of coral reef fishes and sharks.

William D. Wilson (M.S. Teaching of Biology '55), biological sciences instructor at Spoon River College, Canton, IL, was awarded the Illinois Community College Trustees Association Faculty of the Year Award. He has taught at Spoon River College for the last 24 years.

1960s...

Robert T. Allen (Ph.D. Entomology '69) was named chairman of the Department of Entomology and Applied Ecology at the University of Delaware College of Agricultural Sciences in July 1991. He was formerly a professor at the University of Arkansas. His research focuses on how past geological and climatological trends influenced the current distribution of insects.

Alonda Belpulsi Droege (B.S. Biology '69) is a biology teacher at Steilacoom High School, Tacoma, WA.

Roar Irgens (Ph.D. Microbiology '63), who recently retired from Southwest Missouri State University, Springfield, received the 1991 Carski Foundation Distinguished Teaching Award at the annual meeting of the American Society for Microbiology. The award recognizes mature individuals for distinguished teaching of undergraduates and encouragement of subsequent achievements.

Anthony E. Liberta (M.S. '59, Ph.D. Botany '61) was awarded a distinguished professorship by Illinois State University, Normal. His research area is mycology. He has been on the faculty since 1961 and was named an Outstanding University Researcher in 1990.

Ruth Phillips (Ph.D. Genetics '67), professor of biology at the University of Wisconsin-Milwaukee, was one of five faculty members who received the 1991 Graduate School/UWM Foundation Annual Research Award. Her research interests range from a series of studies in human cytogenetics to the molecular genetics of fish. Her innovative use of chromosome banding techniques and recently discovered DNA techniques have shed new light on the evolution of trout and salmon. Many of her research findings have important implications for fish management and conservation.

Janice C. Predmore (B.S. Biology '69) is a computer-assisted instruction specialist at the UIUC College of Veterinary Medicine.

Jerrold H. Zar (M.S. '64, Ph.D. Zoology '67) was reappointed associate provost for graduate studies and research and dean of the graduate school after a campus-wide review following 7 years of service in that position. He oversees the academic research of faculty and students and advanced study of the 7,000 graduate students at Northern Illinois University, De Kalb.

1970s...

William Allen (B.S. Biology '74) was a co-winner of the annual media award of the Third District Missouri Nurses's Association for the article *Emergency Room*, published in the St. Louis Post-Dispatch Magazine. He is the

newspaper's science writer.

Milton B. Armstrong, M.D., (B.S. Biology '79) is an assistant professor of surgery, division of plastic surgery at the Ohio State University College of Medicine. His special interests include microsurgery and hand surgery.

Lee H. Becker, M.D., (B.S. Biology '78) is director of inpatient psychiatric services at the Illinois Masonic Medical Center, Chicago. He is also a clinical assistant professor of psychiatry at Loyola University School of Medicine.

James Berg, M.D., Ph.D., (B.S. Biology '75) recently testified before the Norwegian Parliament concerning new laws on biotechnology. He was an expert witness regarding possible environmental effects of accidental releases of genetically engineered microbes, as well as their direct application to solve environmental pollution problems. He represents Norway on a North Atlantic Treaty Organization European technical committee where the use of microbes to treat industrially contaminated soil and groundwater is a primary issue. He has lived in Norway since 1985 and is a partner in a biotech venture to commercialize his patented inventions.

Michael T. Feingold, M.D., (B.S. Biology '78) recently received his board certification in obstetrics and gynecology. He has a medical office in Palos Heights, IL, and is a member of the medical staff at Palos Community Hospital.

John W. Karesh, M.D., (B.S. Microbiology '73) was named medical director of The Tillers, Oswego, IL, in September. He is a specialist in internal medicine and has also served as an instructor in the Northwestern School of Medicine since 1980.



Lawrence M. Page (M.S. '68, Ph.D. Zoology '72) (pictured above) and **Brooks M. Burr** (M.S. '74, Ph.D. Zoology '77) recently authored *A Field Guide to Freshwater Fishes: North America North of Mexico*. This Peterson field guide is the first to cover all 790 freshwater fish species in the U.S. and Canada, and it includes more than 700 illustrations and nearly 400 detailed maps.

This guide, published in 1991, is the culmination of 8 years of work. Changes in taxonomy, new information on distribution, and other factors relating to species identifications make the "completion" of such a guide almost impossible. The Editor's Note states, "Still, it is of paramount importance, especially to an environmentally conscious society, that the information

necessary to understand the diversity of life be available to the public." The authors note that 11 species of freshwater fishes are already extinct, and another 83 species and subspecies are on the federal threatened or endangered species list.

Dr. Page is a professional scientist and director of the Center for Biodiversity at the Illinois Natural History Survey, Champaign. Before writing the Peterson guide, he authored the *Handbook of Darters* in 1983. "Publishing the book on darters was significant because one-fifth of all freshwater fishes are darters," Dr. Page explained.

Dr. Burr, a long-time colleague of Dr. Page, is a professor of zoology at Southern Illinois University at Carbondale.

Kevin S. Kennedy, D.O., (B.S. Microbiology '75) is a facial plastic surgeon in Tacoma, WA. He recently was accepted as a certificant of the American Board of Facial Plastic and Reconstructive Surgery.

James A. Magner, M.D., (B.S. Honors Biology '73) is a thyroid specialist at Humana Hospital-Michael Reese, Chicago. He spends about half his time doing research on the thyroid-stimulating hormone. He recently presented data at the 10th International Thyroid Congress in The Netherlands and at the American Thyroid Association in Boston. He is married to Glenda ('77) and has two daughters, Erin and Carly.

Jerome T. Pacocha, Certified Hazardous Materials Manager, Certified Environmental Trainer, (B.S. Biology '76) is president of ET3, Inc., a hazardous waste management consulting firm founded in 1986, which specializes in small quantity chemical disposal and hazardous waste/materials consulting, training, and brokering.

Barbara T. Walton (Ph.D. Entomology '78), an environmental toxicologist on the research staff of the Environmental Sciences Division at Oak Ridge National Laboratory, accepted a 5-year term on the Editorial Board of *Environmental Toxicology and Chemistry*. She also serves as an adjunct faculty member at the University of Tennessee in ecology and environmental toxicology.

Janet L. Wissman (B.S. Ecology, Ethology & Evolution '79) had a water color painting of horses featured on the cover of *The Chronicle of the Horse* in August 1991. She is best known for her dog portraits. She also recently donated some of her art to a wildlife art auction for Ducks Unlimited.

Eleanor A. Blakely Zizka, (M.S. '71, Ph.D. Physiology '75) is a senior staff biophysicist at the Lawrence Berkeley Laboratory in Berkeley, CA.

1980s...

Pamela Kay Austin (B.S. Biology '88) returned in October from a 7-month scientific expedition to east and central Africa with the Field Museum of Natural History in Chicago. She has worked for the Museum for the last 3 years as a laboratory technician, performing DNA sequencing and other biochemical techniques for curators in the department of Zoology. She is working on an M.S. degree in carnivore phylogeny at the University of Illinois at Chicago.

Stefan Bledig (B.S. Biology '86) is a research molecular biologist for NutraSweet, a subsidiary of Monsanto Corporation, Mount Prospect, IL. He is also working on the production of Simplesse, a fat substitute made of protein. In addition, he expects to complete his M.B.A. degree this summer at Northwestern University.

James L. Caruso, M.D., (B.S. Biology '84) is a Navy diving medical officer specializing in undersea and hyperbaric medicine. He spent 8 months in the Persian Gulf during Operation Desert Storm/Shield.

Jill Detra (B.S. Biology '88) is a histologist for Boehringer-Ingelheim, a pharmaceutical company in Ridgefield, CT.

Dominic Dubravek, D.D.S., (B.S. Biology '82) is a dental surgeon specializing in periodontics. He recently opened his practice in Kankakee, IL. He is also a clinical instructor at the University of Chicago.

Jeffrey Fasick (B.S. Ecology, Ethology & Evolution '88) is working on his M.S. degree in biology at the University of Maryland. He is also working full-time at the National Aquarium in Baltimore, where he trains the dolphins, beluga whales, and seals. He would like to hear from his classmates; his address

Back to Africa...

Malaria, dysentery, insect infestation, widespread malnutrition, temperatures nearly 120 degrees—a doctor looking for a challenge would easily find one in eastern Africa.

Susan Nagele, M.D., (B.S. Biology '78), who spent 6 years in Tanzania and moved to the Sudan in September, enjoys the challenges. Since graduating from Southern Illinois University School of Medicine in 1981, she has spent her entire medical career as a Maryknoll lay worker in underdeveloped nations.

Dr. Nagele has had malaria so many times she no longer recalls just how many. At first it would put her to bed for a week, but she says, "Now I just get a headache."

She has also grown so accustomed to the sweltering heat that central Illinois was just a little chilly for her during her visit to Urbana in July.

Civil water in Sudan could be

more inconvenient. The Muslim government at Khartoum has been hunting the Sudanese Peoples Liberation Army and other factions since 1983, with obvious disruption of medical services.

"There are no buses, no systems to deliver medicine. If you open a health clinic, there's no way to get there. There's nobody to talk to about solving the problem for that matter. If they can win peace, life can get back to normal."

She can't say how long the stint in the Sudan will last, perhaps 5 years. There is a measles epidemic in the southern Sudan. The Maryknoll workers, with the help of UNICEF, have worked out some of the problems in storage and transport of the measles vaccine, which must be kept cold. New solar refrigerators have saved large batches from getting spoiled.

She concluded by saying, "The people are the fun part."

—Excerpted from an article by Bob Wood, News Gazette, July 21, 1991

is 841 S. Bond St., Baltimore, MD 21231.

Kristin L. Goltry, (B.S. Biology '86) completed her Ph.D. degree in cellular biology at Northwestern University, Evanston. She plans on doing postdoctoral research in Paris, France.

Susan M. Nicoll Harmon, M.D., (B.S. Physiology '84) completed her residency in family practice in June 1991. She joined two other family physicians in private practice in Lincoln, IL.

She is married to Robert Harmon (B.S. Agricultural Economics '83) and has a son Gregory, born in June 1990.

Donna J. Helmchen (B.S. Genetics & Development '87) received an M.D. degree from Loyola University's Stritch School of Medicine, Chicago, in June. She is a first-year resident in Internal Medicine at Loyola Medical Center, Maywood. She plans to transfer to Milwaukee Regional Medical Center in the summer for her residency in emergency medicine/trauma.

Delayne Holsapple (B.S. Ecology, Ethology & Evolution '88) is the aquaculture and diversified agriculture specialist for the Illinois Department of Agriculture, Springfield. She completed her M.S. degree in aquaculture at Texas A & M University in 1990.

Kent Knoernschild, D.D.S., (B.S. Microbiology '82) is an assistant professor in Prosthodontics, Medical College of Georgia School of Dentistry, Augusta. He was selected as one of six national semifinalists in the 1990 John J. Sharry Prosthodontic Research Competition sponsored by the American College of Prosthodontists for his work in TMJ radiography.

Thomas D. Lee (Ph.D. Plant Biology '80) is an associate professor of plant biology at the University of New Hampshire, Durham.

Brian Locker, M.D., (B.S. '82, M.S. Biology '83) is a staff obstetrician/gynecologist at K.I. Sawyer AFB, MI. He is also the proud father of Philip Henry, born May 16, 1991.

James A. Marrs (B.S. Biology '84) received his Ph.D. degree at the University of Illinois at Chicago in 1991 and is currently a postdoctoral fellow at Stanford University School of Medicine.

Quan Nguyen (B.S. Biology '87) received his D.D.S. degree in 1991 from Northwestern University, Evanston.

Yasemin A. Ozcan, M.D., (B.S. Genetics & Development '85), after completing her internship in internal medicine at UIUC, took a year "off" to work part time at the Hammond Clinic in Indiana and have a son, Nathan Ruby, born February 8, 1991. In July, she entered residency at the Rehabilitation Institute of Chicago (Northwestern University). She says, "I am thrilled to be in this exacting and rapidly changing field." She is married to Allan Ruby,

M.D., who graduated from UIUC School of Medicine in 1990.

Joseph M. Pawlak (B.S. Microbiology '86) received his M.B.A. degree in 1990 from Loyola University. He is currently a food industry consultant with Technomic, Inc., Chicago.

Steven Pector, D.O., (B.S. '82, M.S. Biology '84) completed his residency in family practice at MacNeal Hospital, Berwyn, IL, and is now in private practice and on staff at Humana Hospital, both in Hoffman Estates, IL. He is a Diplomate of the American Board of Family Practice. He presented his research on *Preadolescent AIDS Awareness* at the Illinois Academy of Family Practice's annual Family Practice Educators meeting in October 1991. He is married to Maura (Carey) Pector, a graduate of UIUC with a B.S. in labor and industrial relations. She recently completed her Master's degree at Loyola University in human resources.

Julie Savastio (B.S. Microbiology '82) received the Elijah Watt Sells award for her exceptional score on the Uniform Certified Public Accountancy Examination. Her score placed her in the top 119 of 75,500 students taking the exam.

1990s...

Lisa Blaydes (B.S. Biology & History '90) is working toward a Ph.D. degree at the University of Illinois at Chicago. She is researching insulin growth factors.

Cynthia H. Chou (B.S. Physiology '91) was named a 1991-92 Luce Scholar. This program allows outstanding young Americans in a variety of professional fields to have an opportunity to live and work in Asia during a 10-month internship. She is working at the Third School of Clinical Medicine, Beijing Medical University, Beijing, China.

Marty Esgar (B.S. Teaching of Biology '91) is teaching high school chemistry in Deerfield, IL.

Marcos E. García-Ojeda (B.S. Microbiology '90) is a graduate student in molecular, cellular, and developmental biology at the University of California, Santa Cruz. He was awarded a 1991 NSF minority fellowship to do research on the biology of class I MHS antigens with Prof. Martha Zúñiga.

Warren Frank Lamboy (Ph.D. Plant Biology '90) is a biometrician/botanist with the Plant Genetic Resources Unit, Cornell University, Geneva, NY.

Suzette D. Schultz (B.S. Biology '90) is a Visiting Research Specialist in Life Sciences in the department of Entomology, UIUC. Working with Drs. Gene Robinson and Susan Fahrback, she is studying how hormones contribute to honeybee behavior. ▼

School of Life Science Facts

Student Enrollments—Fall 1992

Undergraduate students	1,853
Graduate students	384

Degrees Conferred—1991-'92

Bachelor	390
Master	44
Doctor	52

► in memoriam

George R. Berggren (M.S. Teaching of Biology '60) died July 28, 1991. He was a retired Quincy High School biology teacher, Quincy, IL.

Ralph W. Dexter (Ph.D. Zoology '38), an emeritus professor of biological sciences at Kent State University, died October 29, 1991, "leaving a legacy as far and as wide as a chimney swift could fly." Dr. Dexter was a world-renowned ornithologist and an authority on the chimney swift. During his 45-year career at Kent State University, he was honored with the Outstanding Faculty Member Award and the President's Medal for distinguished service. The Kent State seal features a chimney swift flying over a sunburst to represent the research component of the university.

Ralph E. Good, Ph.D., (M.S. Botany '61), a biologist whose studies of the New Jersey Pinelands helped lead to the preservation of 1.1 million acres covering nearly a fourth of the state, died December 10, 1991. After earning his doctorate at Rutgers University, he remained there, serving as a botany professor, director of the graduate biology program, and biology chairman. Tidal marshes and other wetlands were his special interests. His research was the basis for Congress' creation of the Pineland National Reserve in 1978 and its later designation as a coastal plain reserve by UNESCO.

David B. Holm III, D.D.S., (B.S. Biology '76) died November 5, 1991 in Phoenix, AZ. ▼

*School of Life Sciences
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are welcome and should be
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Name _____

Address _____

State & Zip _____

Degree, Department, & Year _____

Additional Degree(s) _____

Current Activity/Employment _____

SOLS Enhancement Funds Advance Graduate Research

Ms. Tamara L. Jones, a graduate student in Plant Biology, will be attending a course at Cold Spring Harbor Laboratory in April, thanks in part to an award through the School of Life Sciences Enhancement Fund.

Ms. Jones, working in Dr. Donald Ort's laboratory, is studying the effects of chilling temperatures on photosynthesis in such chill-sensitive plants as tomato, cucumber, and corn. Photosynthesis in these plants is sharply reduced by chilling at temperatures that are above freezing. For example, in an experimental set-up mimicking a cold night, there is a 60 percent reduction in light and carbon dioxide saturated photosynthesis.

This reduction is localized in the chloroplast, although the underlying mechanism of the inhibition is un-

known. Ms. Jones is interested in studying this mechanism and the specific reactions that are inhibited by chilling temperatures.

To approach this question, she is studying the proteins that are synthesized during the recovery phase following a chill. Specific proteins are synthesized in the chilled plant that are not synthesized in unchilled controls. And at least one protein is synthesized in other chill-sensitive plants but not by chill-insensitive plants.

As Ms. Jones works toward her doctoral degree, she will be focusing on identifying these proteins and determining their role in the effects of chilling on photosynthesis. To accomplish these goals will require using advanced protein techniques which she will learn during the 2-

(continued on page 6)



Photo by Jim Corley, B & W Photo

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University of Illinois at Urbana-Champaign

School of Life Sciences

alumni newsletter

fall 1992

Developmental Neurobiology — Understanding the Diversity

How do different neurons become different? How do embryonic cells that once were identical specialize into a remarkable number of functionally distinct neurons with exquisite specificity? What genes are involved in generating this diversity and how do they work? And are these typical questions for a former ecology student to ask? They are if you are Chris Q. Doe, assistant professor of Cell & Structural Biology and a developmental neurobiologist. Now instead of studying the organization of organisms in an ecosystem, he studies the development and organization of neurons in the central nervous system. And his research has brought him recognition as a National Science Foundation Presidential Young Investigator and as a Searle Scholar.

Dr. Doe's model system is the fruit fly central nervous sys-

tem, which has molecular and cellular similarities to many vertebrates, including humans. However, the fruit fly provides a much simpler system on which to work, with perhaps only 20,000 neurons (instead of some 10^{12} neurons in humans) and 500 genes regulating neurogenesis. He is also able to make a wide variety of mutant fruit flies and quickly follow genera-

tions to determine the effects of the mutations, which would not be possible with humans.

To begin to understand molecular mechanisms behind neurogenesis, *i.e.*, how genes supply information to the neurons, Dr. Doe first has to define neurons in normal fruit flies—who are they, where do they go, and

(continued on page 8)



Photo by Jim Corley, B & W Photo

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The Director's Perspective

As Maria and I sat before the computer one Saturday morning in late summer linking up DNA fragments into what we hoped would be a meaningful sequence of nucleotide bases, I felt a great deal of satisfaction and even accomplishment. I sensed a similar feeling in Maria's voice as we worked together to deal with an uncooperative computer operating system with which neither of us was familiar. Based on Maria's suggestion, we finally coaxed the computer to perform the desired comparison.

versity. She had gained much knowledge in her chosen field of biology. Again, this was to be expected. Through her other course work and associations with faculty and students, her horizons had expanded. What Maria did not expect—indeed what she had no notion of when she arrived on campus—was the satisfaction that she would derive from participating in scientific research. Whatever her future, her experience in the research laboratory has enriched her intellectually and made her cognizant of career opportunities that she never imagined.

Maria's experience is not unique. In spring 1992, 176 undergraduate students were engaged in research projects for course credit under the direction of SOLS faculty. Last summer 91 students were similarly engaged, while the count for fall 1992 was 113. Under the one-on-one tutelage of faculty, these students have been exposed to the intellectual and social aspects of the creative research laboratory and have experienced the frustrations and joys of scientific research. Many will complete a research thesis, and it is not uncommon for such students to publish their results.

Many graduating seniors tell me that their most enjoyable and satisfying activity at the university was research. Similarly many faculty say that working with such undergraduates in their laboratories is among the most gratifying activities for them as teachers. And both are fortunate that the University of Illinois provides such an opportunity in its role as a great research university.

—Jordan Konisky, Director

“Under the one-on-one tutelage of faculty, these students... have experienced the frustrations and joys of scientific research.”

Maria joined my laboratory in her sophomore year. While her initial duties were to wash glassware and to prepare media, she expressed an interest in our studies on methane-producing archaeobacteria, and so she was given the opportunity to become involved in one of our laboratory research projects. During her junior year, she somehow managed her time so that she could work in the research laboratory while also carrying a full load of courses. This past summer, Maria worked in the lab full time. Now in her senior year, Maria is continuing her research which will culminate in a thesis.

As we talked together that Saturday morning, we both reflected on what had taken place over the course of these past 3 years. She had matured intellectually, but that was not surprising considering that she had chosen to attend an outstanding uni-

Archaea, Evolution, & the Origin of Life

“Microbiology is unique among the biological sciences in that it developed for a long time—up through the end of the 1960’s—without any evolutionary framework,” says Carl Woese, professor of Microbiology and Ecology, Ethology & Evolution, and recipient of the Leeuwenhoek Medal. Zoology and botany developed within an evolutionary framework, “but most of what was known

it and relate it to other plays by the same author. When he began the cataloging effort, he had “no inkling” that he would find the Archaea.

Before Woese’s work, all biologists believed that there were two types of living systems on this planet, the eukaryotes (*e.g.*, plants and animals) and prokaryotes (bacteria), which differed fundamentally as regards cell type. Eukaryotic cells

“An organism cannot be understood apart from its evolutionary history.”

about bacteria was largely anecdotal and could not take on greater significance because we didn’t know who was related to whom. An organism cannot be understood apart from its evolutionary history.”

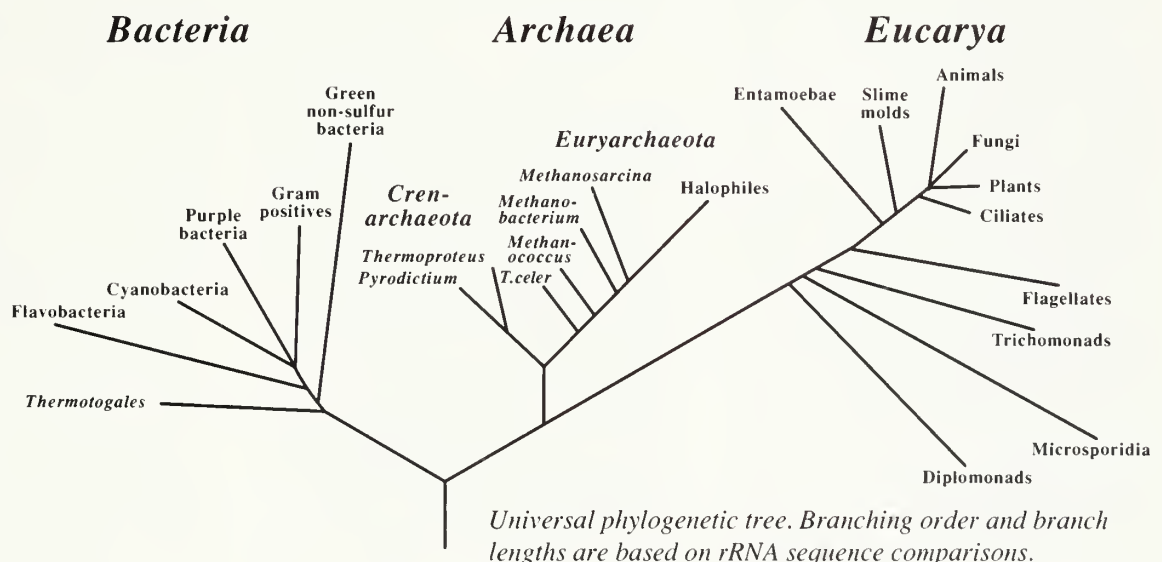
Dr. Woese became interested in the phylogeny of bacteria because of an interest in understanding the origin of life. By the mid-60’s, techniques had been developed that would provide biologists historical information about microorganisms, and Dr. Woese began “cataloging” bacterial ribosomal RNAs. He explained the technique as being similar to taking a play and breaking it down into a catalog of words and phrases—you can’t understand the play this way, but you can uniquely identify

had their genetic material enclosed in a membranous nuclear “sack” and had various “organelles” in the surrounding cytoplasm. Prokaryotic cells showed none of these features. “Just because two organisms don’t have these eukaryotic features, you *can* call them prokaryotes, but you *can’t* say they are necessarily related to one another—that was biology’s big mistake.”



In collaboration with Dr. Ralph Wolfe’s lab, Dr. Woese’s lab characterized the methanogens—anaerobic bacteria that produce methane gas as a metabolic by-product—by the new molecular techniques. And they found them to be unlike any of the other prokaryotes they had characterized. “At that point all we could say was here was a very unique group of pro-

(continued on page 7)



contributors

School of Life Sciences' 1992 annual fund drive

Contributions to the School of Life Sciences Enhancement Fund, the Biology Library Endowment, or designated gifts through the LAS Annual Fund. Contributions received through August 31, 1992.

Dean's Council

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► a BIG thank you

to all our contributors to the annual fund drive. As of the end of August, we had received \$18,549 in contributions—185% of our goal!

When the annual fund drive was started 3 years ago, we set a goal of raising \$10,000 for the biology library, the minimum required by the University to establish an endowment. Through your generosity, we added \$10,909 to the endowment, for a 3-year total of almost \$26,000. Although the biology library continues to face budgetary constraints, the endowment will provide a measure of increased support to maintain the excellence that we all have come to appreciate.

Additionally, \$5,270 was designated for the School of Life Sciences Enhancement Fund, which assists graduate student by currently providing off-campus tuition for special courses. And \$2,370 was designated through the LAS annual fund drive.

Again, thanks. ▼

► faculty updates

May R. Berenbaum, professor of Entomology, was named department head in August. She succeeds Stanley Friedman.

Edward H. Brown, associate professor of Ecology, Ethology & Evolution, was appointed associate director for academic affairs for the School of Life Sciences in August.

Antony R. Crofts, professor of Biophysics and Microbiology, was awarded the 1992 Charles F. Kettering Award of the American Society of Plant Physiologists. This award, established by the Kettering Foundation in 1962, recognizes excellence in the field of photosynthesis.

Howard S. Ducoff, professor of Physiology & Biophysics, retired in May after 35 years at the University.

A.F. (Rick) Horwitz, professor and head of Cell & Structural Biology, was named to the 14-member committee that will search for a successor to Chancellor Morton W. Weir, who will resign from the top campus post effective July 1, 1993.

Thomas W. Jacobs, associate professor of Plant Biology, was appointed a fellow in the Center for Advanced Study. This semester appointment will allow him to conduct research on "a higher plant cell division induction pathway."

Benita S. Katzenellenbogen, professor of Physiology & Biophysics and Cell & Structural Biology, was plenary lecturer at the Annual Endocrine Society Meeting in San Antonio, TX, in June. The meeting was attended by over 5,200 basic science and clinical endocrinologists. Her presentation was "Mul-

tiple pathways in the hormonal regulation of breast cancer cells."

Sondra Lazarowitz, associate professor of Microbiology, has been named director of the Howard Hughes Program for Undergraduate Education in the Life Sciences.

Roderick MacLeod, associate professor of Cell & Structural Biology, received the William F. Prokasy Award for Distinguished Teaching by the College of Liberal Arts & Sciences and was a finalist for the University's Harriet & Charles Luckman Undergraduate Distinguished Teaching Award.

Tom L. Phillips, professor of Plant Biology, was the 1992 recipient of the Gilbert H. Cady Award of the Geological Society of America in recognition of his work "in the field of coal geology."

Glen Sanderson, emeritus professor of Ecology, Ethology & Evolution and former head of the Center for Wildlife Ecology at the Illinois Natural History Survey, received the 1992 Aldo Leopold Award from the Wildlife Society. The award is presented for distinguished service to wildlife conservation.

Dale M. Steffensen, professor of Cell & Structural Biology, received a Fulbright grant to lecture and conduct research at the National Plant Breeding Station, Elvas, Portugal in spring 1993. He retired in August.

Ralph S. Wolfe, emeritus professor of Microbiology, was honored on his 70th birthday by an international symposium on topics in microbial diversity, metabolism, and physiology, May 22-23, at the Beckman Institute. The program was organized by several of his former graduate students.

The following faculty were promoted in August: **Carol K. Augspurger** from associate professor to professor; **Thomas W. Jacobs**, from assistant professor to associate professor; and **John Whitmarsh**, from associate professor to professor. All are from the department of Plant Biology. ▼

► in memoriam

Richard B. Selander, emeritus professor of Entomology, died August 26 at his home in Gainesville, Florida. Dr. Selander, who began at the University of Illinois in 1958, was the world authority on the systematics of blister beetles (*Meloidae*). His lifelong interest in statistics and in application of computer technology to the analysis of data resulted in the development of the first software useful for systematic analysis of taxonomic data. ▼

School of Life Sciences Alumni Newsletter is published semi-annually by the School of Life Sciences, University of Illinois at Urbana-Champaign. Comments and suggestions are welcome and should be addressed to:

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Stanley Friedman Retires



Andrew Chung-Hsin Chen (Ph.D. Entomology '76) and **Carol Anelli Sheppard** (Ph.D. Entomology '88) were among students and colleagues who attended the retirement celebration in honor of **Stanley Friedman** on September 2 at the Lakehouse, Crystal Lake Park, Urbana.

Dr. Friedman retired in August after 28 years at the University of Illinois. He served as Head of Entomology since 1975 and as Associate Director of Academic Affairs for the School of Life Sciences since 1988.

He was awarded emeritus standing and will continue his research on the physiological bases of metabolic and nutritional capabilities displayed by insects and mechanisms underlying their ability to adapt to new food sources.

► graduate awards

The following graduate student awards were presented at the annual SOLS Reception in May:

Robert Emerson Award

Heidi S. Feiler, Plant Biology

Edwin M. Banks Memorial Award

Cheryl L. Trine, Ecology, Ethology & Evolution

Francis M. & Harlie M. Clark

Summer Grant

H. David Clarke, Plant Biology

Cheryl D. Condon, Neuroscience

David C. Ludolph, Cell & Structural Biology

Eric S. McCloud, Entomology

Michael E. Retzer, Ecology, Ethology & Evolution

Francis M. & Harlie M. Clark

Research Support Grant

H. David Clarke, Plant Biology

Hua Lou, Plant Biology

Robert K. Olendorf, Biology

Paula Ostrovsky de Spicer, Microbiology

James E. Whaley, Physiology & Biophysics

Outstanding Teaching in Biology 110/111

Jeffrey W. Gilardi

Melissa Michael

Outstanding Teaching in Microbiology

Min-ken Liao

Outstanding Teaching in Plant Biology

H. David Clarke

Karin E. Readell

Archaea, Evolution, & the Origin of Life

(continued from page 3)

karyotes, so different they shouldn't really be called 'prokaryotes' in one sense."

But there were other "funny" organisms yet to be examined, *e.g.*, the extreme halophiles which grow in very salty environments such as the Great Salt Lake, or the organisms that grow in the highly acidic boiling sulfur pots in Yellowstone Park. These organisms inhabiting bizarre niches also had some biochemical idiosyn-

crasies, *e.g.*, highly unusual lipids. And they too turned out to be unlike normal bacteria by the new molecular measure. Better yet, they and the methanogens were all related to one another, forming a new group of organisms, originally known as the archaeobacteria.

These efforts were eventually assimilated into an evolutionary tree with three primary branches, three "domains" as they are now called—

Bacteria, Archaea, and Eucarya—a classification now widely accepted.

It has been said of Louis Pasteur, the 1895 Leeuwenhoek Medal recipient, that he had the ability to analyze and bring together pieces of the puzzle that form the grand scheme of microbiology—and perhaps the same can be said of Carl Woese and the grand scheme of life. ▼

Developmental Neurobiology — Understanding the Diversity

(continued from page 1)

what do they do. Then he makes mutations by feeding toxic chemicals to the flies, which causes “breaks” in their DNA. These breaks may eliminate a particular gene, which is then sequenced to learn its identity. The mutants are evaluated and the associated genes are cloned using recombinant DNA techniques to produce mutant lines for study.

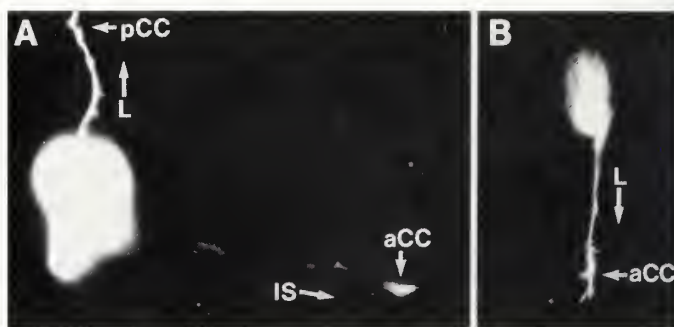
In the mutants, neuronal diversity is lost. Neurons become similar when genes are taken away. Now, instead of a series of neurons going to A, B, and C, they may all go to A. And the most dramatic changes occur early in embryogenesis. But because the neurons are extremely small, how do you know exactly what has happened?

Dr. Doe’s lab (which includes 4 graduate students, 3 undergraduate students, a visiting professor, and a technician) uses two techniques to evaluate the effects of gene deletion and the resulting loss of neuronal diversity. Fluorescent-labeled antibodies, which bind to specific proteins, are applied to the nervous system. The antibody binds to the protein, and the fluorescent tag indicates the location of the protein (see photograph 1). Changes in protein location in the embryo indicates changes in neuron diversity. They also use a microelectrode to fill a single neuron with fluorescent dye (photograph 2), which allows them to trace the neuronal pathways in both normal and mutant flies.

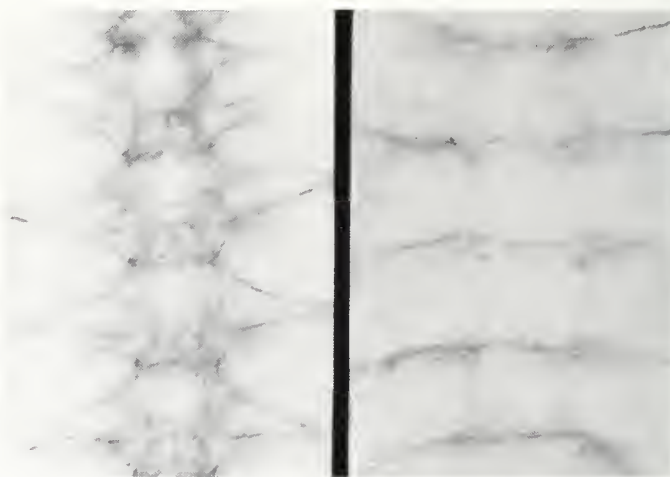
But how does a cell “learn” to become a particular type of neuron? Is it nature (inherited) or nurture (external influences)? Of the genes that Dr. Doe’s group has studied to date, one gene regulates other cells,

which then send a growth factor (an external influence) to the neurons. This gene switches on early in the development of the nervous system. The other eight or so genes he has studied are inherited, *i.e.*, only in the neuron itself. Normal development appears to require both.

His next step is to test these theories using vertebrate counterparts. Ultimately results of this and complementary research may help us understand how neurons are organized in man, how they function, what causes neurodegenerative diseases, and how they may be treated. ▼



1. Injection of a fluorescent dye into single neurons will reveal their shape. **A:** In normal flies, interneurons (like pCC) grow towards the head or “tail” to synapse with other neurons, while motor neurons (like aCC) grow sideways to synapse with muscles. **B:** In embryos mutant for the *eve* gene, the aCC neuron thinks it is an interneuron and grows towards the tail of the fly.



2. The whole central nervous system can be stained with an antibody to reveal the shape of a subpopulation of neurons. **Left:** In normal flies, interneurons (growing up and down) and motor neurons (growing sideways) can be seen. **Right:** In embryos mutant for the *prospero* gene, all neurons think they are motor neurons and grow sideways.

► alumni news

1950s...

John Paul Kramer (Ph.D. Entomology '58) is professor emeritus in insect pathology at Cornell University, Ithaca, NY, and was listed in *Who's Who in America* in the 1989-90 edition. His current interests center on breeding and showing of English Spot and Netherland Dwarf rabbits plus Alyssinian cavies.

1960s...

Leslie J. Block, M.D., (B.S. Zoology '68) is assistant professor of otolaryngology at Rush Medical College and in 1991 was named chairman of the department of surgery at Lake Forest Hospital, Lake Forest, IL. Dr. Block is a fellow of the American Academy of Otolaryngology Head & Neck Surgery and the American College of Surgeons.

Harris S. Goldenberg, M.D., (B.S. Zoology '64) is attending surgeon and junior surgical clerkship coordinator at Humana Hospital-Michael Reese. He is also a clinical associate professor of surgery at the University of Illinois College of Medicine, Chicago, and serves on their M-3 subcommittee.

David M. Goldstein, M.D., (B.S. Zoology '68) is clinical associate professor in psychiatry, Georgetown University Medical School, Washington, DC, and a faculty member of the Washington Psychoanalytic Institute. He is director of the Mood Disorders Clinic at Georgetown and has a private practice in psychiatry and psychoanalysis.

Donald R. May, M.D., F.A.C.S., (B.S. Microbiology '68) is professor and chairman of the department of Ophthalmology, Texas Tech University Health Sciences Center, Lubbock. His areas of expertise are retinal vascular occlusive diseases, vitreoretinal surgery, and

ocular trauma. He is medical director of the Texas Eye Injury Registry and is first vice-president of the United States Eye Injury Registry. He is listed in the 1992 edition of *Who's Who in America*.

Graciela Meza-Ruiz, Ph.D., (M.S. Zoology '67) is professor of neuroscience at the Institute for Cell Physiology, National University of Mexico. Her research interest is the biochemistry of the inner ear. She is vice-president of the Mexican Society for Developmental Biology.

John C. Munday, Jr. (Ph.D. Biophysics '68) is associate dean and professor of natural sciences, School of Public Policy, College of Law & Government, Regent University, Virginia Beach, VA. His wife Judi (B.A., M.Ed. '68) received an M.A.Ed. in 1985 from Regent University and teaches special education at Western Branch Junior High School, Chesapeake, VA.

1970s...

Joel R. Coats (Ph.D. Entomology '74), professor of entomology and toxicology at Iowa State University, received their Foundation Award for Mid-career Achievement in Research. He has been a faculty member in the department for 14 years and is serving his fourth year as chair of the toxicology interdepartmental program. This year he is chairman of the division of Agrochemicals, American Chemical Society.

Norman C. Ellstrand, Ph.D., (B.S. Biology Honors '74) was promoted to professor of genetics, department of

Botany & Plant Sciences, University of California-Riverside, in June 1991. In February 1992, he received the "Award of Honor" from the California Chermoya Association for his work in genotyping cultivars of this specialty fruit tree. He also recently documented how swiftly genetically altered crop plants can confer new properties on wild relatives. He found that "marker genes" in cultivated radishes showed up in similar plants more than half a mile away.

Peyton S. Metzel (B.S. '72, M.S. '74, Ph.D. Biology '79) is working on an executive MBA program at the Lake Forest Graduate School of Management, Lake Forest, IL. He is program manager, viral inactivation, Fenwal Division of Baxter Healthcare.

Robert B. Polisky, M.D., (B.S. Microbiology '75) is director of the Elk Grove Psoriasis Treatment Center, Elk Grove, IL. He recently moderated the *Psoriasis Symposium II*, which was attended by patients, families, and physicians.

Michael S. Simon, M.D., M.P.H., (B.S. Biology '79) is assistant professor of internal medicine, division of Medical Oncology at Wayne State University, Detroit, MI. He also has an appointment at the Michigan Cancer Foundation and is conducting research in cancer epidemiology.

Robert E. Wrigley (Ph.D. Zoology '70) was named director of the new national Oak Hammock Marsh Interpretive Centre, Winnipeg, Manitoba. His area of specialization is wetland education.

1980s...

Janice Louise Anderson (B.S. Biology, German '81) received an M.B.A. degree from the University of Chicago in 1989 and is employed as director of



Dolowy's Work in Smithsonian

In the 1960's, William Dolowy (B.S. '48, M.S. Zoology '49, B.S. Vet. Med. '51, D.V.M. '53) led research to discover a treatment for leukemia, and as a result of his work, the enzyme L-asparaginase was introduced to treat acute lymphocytic leukemia in children. As a veterinarian, he was a pioneer of L-asparaginase as a human therapy that arose from veterinary medicine. And now, copies of his scientific articles, his notebooks, and data are part of the Smithsonian Institution's collection of modern scientific treasures.

Dolowy, who's been practicing veterinary medicine on Mercer Island (WA) since 1976 and is owner of the Animal Care Hospital of Mercer Island, recently donated his research materials to the Smithsonian. He responded to their requests for documentation of significant contributions made by veterinarians to human health.

Dolowy submitted reprints of articles he published on L-asparaginase while he was head of the Medical Research Laboratory at the University of Illinois, Chicago, and later professor and chairman of Experimental Animal Medicine, University of Washington School of Medicine.

Dolowy was the first to report on the treatment of lymphoma with L-asparaginase, and published some 20 articles about it between 1966 and 1975. The use of asparaginase along with standard medication began in the 1970's, a time when the survival rate for children with the disease was only 3 percent. Today, up to 95 percent of the children who receive this treatment go into remission within a month and an average of 50 percent of children show no symptoms after 5 years. Children with a low blood count who begin treatment between 2 and 10 years of age have an 80 percent disease-free survival rate.

Dolowy was named Veterinarian of the Year by the Washington State Veterinary Medical Association in 1988. He and his wife Joan [B.S. '51] have two children.

— Excerpted from an article in the Mercer Island Reporter, Jan 22., 1992

marketing for The American Theological Library Association, Evanston, IL. She reports, "I really love direct marketing!"

Rodney E. Anderson (B.S. Biology '84) was awarded a department commendation by the Illinois State Police. A forensic scientist in the serology department of the State Police Laboratory, Chicago, he was recognized for his innovation and creativity.

Catherine A. Bishop, D.D.S., (B.S. Biology '82) received a speciality certi-

ficate in periodontics from the University of North Carolina in 1988 and practices periodontics in Moline, IL. She is married to James E. Bishop, D.D.S.; they reside in Rock Island.

Karen Crawford (M.S. '85, Ph.D. Biology '87) is assistant professor of biology, St. Mary's College of Maryland, St. Mary's City.

Juliet Spelman Dieperink, M.D., (B.S. Honors Biology '84) is completing her psychiatry residency (chief resident)

at the University of Chicago. She has accepted a position as assistant professor in the department of Psychiatry at the University of Illinois, Chicago. She is married to Michael Dieperink.

Tara M. Breslin (B.S. Biology '88) received her M.D. degree from Baylor College of Medicine, Houston, TX, and began general surgery residency at Baylor in July.

Brian C. Hampson, Ph.D., (M.S. Biology '83) is assistant professor and biotechnology specialist in the department of Food Science & Nutrition, California Polytechnic State University, San Luis Obispo. He was a microbiologist with McCormick/Shillings, Gilroy, CA. His research includes microbial control in fruits, vegetables, and spices through better processing and enzymatic modification of beverages.

Wendy A. Havelka, Ph.D., (B.S. '85, M.S. Biology '88) was awarded an European Molecular Biology Organization (EMBO) postdoctoral research fellowship for her work on retinal proteins from *Halobacteria* with Professor Dieter Oesterhelt. She is at the Max-Planck-Institut für Biochemie, München, Germany.

Bridget M. Hayes, D.V.M., (B.S. Honors Biology '84) is an associate veterinarian at Beech Grove Animal Hospital, Indianapolis. She is still riding "the same old bicycle" but has gotten her driver's license and a car. She is currently living with two cats, Cosmo and Maynard.

Jeanne McElligott (B.S. Biology '88) received a B.S. in physical therapy from the University of Illinois, Chicago in June 1991. She is working at MacNeal Hospital in Berwyn, IL, and "loves it."

Kenneth Muranaka (M.S. Biophysics '85) is assistant professor of life sciences at Mizuho Junior College,

Nagoya, Japan. His research interests are mathematical simulation and data reduction in biological spectroscopy.

Pradip D. Patel (B.S. Microbiology '88) completed his M.D. degree at Southern Illinois University School of Medicine in spring 1992 and began pediatric residency at the University of Louisville in July.

Deborah A. Purcell-Huynh (B.S. Microbiology '86) is a graduate student researcher in Dr. A.J. Lusic's lab, Microbiology & Molecular Genetics, University of California, Los Angeles.

Herman Salzberg, D.M.D., (B.S. Biology '83) opened an office in Palatine, IL, 2 years ago. "It was tough going at first, but things are moving along quite nicely now!"

Thomas A. Small, Ens., (B.S. Ecology, Ethology & Evolution '89) was designated a Naval Flight Officer in July 1991 while serving with Carrier Airborne Early Warning Squadron-110, Naval Air Station, Miramar, San Diego.

Peter H. Soboroff (B.S. '85, M.S. Biology '88) was a biologist for the Illinois Natural History Survey at Havana until he entered UIUC's College of Veterinary Medicine in August.

Shelly D. Timmons, M.D., (B.S. Honors Biology '87) is a resident in training in the neurosurgery program at the University of Tennessee, Memphis.

1990s...

Francisco DeLaCruz-Newlan, Ens., (B.S. Microbiology '91) completed Officer Indoctrination School, Naval Education & Training Center, Newport, RI. He joined the Navy Reserves in April 1991.

Jennifer Gerez (B.S. Ecology, Ethology & Evolution '90) is working as a birdkeeper at the Jacksonville Zoo, Jacksonville, FL.

Carol Johnston (Ph.D. Biology '92) received the 1992 Stoye Award in Ecology & Ethology from the American Society of Ichthyologists & Herpetologists.

The award is presented to the best paper in ecology or ethology presented at the annual meeting by a student member of the Society.

Renee Papineau (B.S. Anatomical Sciences '90) is an ASCP-registered cytotechnologist and supervisor of the histology and cytology department at Covenant Medical Center, Urbana, IL.

Angela Michelle Quick (B.S. Biology '91) is attending the physical therapy program at Washington University School of Medicine, St. Louis, MO. She will graduate with an M.S. degree in P.T. in December 1993. ▼

► in memoriam

William D. Wilson (M.S. Biology '54), an instructor of biological sciences at Spoon River College, Canton, IL, died October 18, 1991. ▼

► let us hear from you

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Urbana, IL 61801*

Name _____

Address _____

State & Zip _____

Degree, Department, & Year _____

Additional Degree(s) _____

Current Activity/Employment _____

Woese Awarded Leeuwenhoek Medal

Dr. Carl Woese, professor of Microbiology and Ecology, Ethology & Evolution, was selected by the Royal Netherlands Academy of Arts & Sciences to receive the "Leeuwenhoek Medal 1990" for his discovery of Archaea. This international award was established in 1875, the second centenary of the discovery of the microbial world by Antonie van Leeuwenhoek. The award is presented to the scientist who has made outstanding contributions to the advancement of microbiology during the preceding 10 years (*see page 3*).



Recipients of the Leeuwenhoek Medal.

1875	C.G. Ehrenberg	<i>pioneering work in microbiology and micropaleontology</i>
1885	F.J. Cohn	<i>father of bacteriology</i>
1895	L. Pasteur	<i>disproved spontaneous generation; pioneering work in fermentative metabolism</i>
1905	M.W. Beijerinck	<i>developed technique of enrichment culture</i>
1915	D. Bruce	<i>discovered bacteria causing insect-borne diseases</i>
1925	F.H. d'Herelle	<i>discovered bacteriophages</i>
1935	S.N. Winogradsky	<i>established basis for microbial physiology</i>
1950	S.A. Waksman	<i>discovered streptomycin, antinomycin, neomycin, and candididin</i>
1960	A. Lwoff	<i>pioneering work in lysogenic viruses</i>
1970	C.B. van Niel	<i>defined metabolism of anoxygenic photosynthesis</i>
1980	R.Y. Stanier	<i>defined structure and organization of bacterial cells</i>
1990	C.R. Woese	<i>discovered Archaea and developed universal evolutionary tree</i>

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School of Life Sciences

alumni newsletter

spring 1993

"Jumping" Genetics

Geneticists once believed that every gene had a particular place, or locus, on a chromosome. But Barbara McClintock's discovery almost a half century ago changed that genetic theory. Working with maize, she found that some genes move—or jump—both within and between chromosomes. "We now know that every organism has a variety of 'jumping' genes, or transposable elements, perhaps 10-15% of the total genetic complement," says Hugh M. Robertson, assistant professor of Entomology.

One such family of transposable elements is named *mariner*, which was first discovered in *Drosophila mauritiana*, a fruit fly restricted to the island of Mauritius, by Dan Hartl's lab in 1985. In a serendipitous discovery in 1991, other researchers discovered a related transposable element in the cecropia moth, *Hyalophora cecropia*.

Intrigued by these similarities, Dr. Robertson used a new molecular technique, called PCR (polymerase chain reaction), to extend the search for *mariner* elements to a variety of organisms. His preliminary results were recently published in the journal *Nature*.

The *mariner* element (approximately 1300 nucleotide base pairs long) contains a gene that encodes a *transposase* which allows *mariner* to "jump." In comparing

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Photo by Jim Corley, B & W Photo

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The Director's Perspective

In February 1993, I participated in a conference organized by the Coalition for Education in the Life Sciences. I was honored to be asked to speak on “How does biology contribute to literacy and a liberal education?”

My presentation ranged over several topics relating to the place of biology in the undergraduate curriculum—the character of a liberal education, biology literacy for all

ence; (ii) provide a rational basis for a standard of ethics based on an understanding of the human condition; and (iii) include the discovery and definition of our intellectual, cultural, and institutional roots.

“There is an old saying that education is what is left over after what has been learned has been forgotten. Education should teach students how to learn, instill the excitement of the process of learning, and imbue students with the desire to maintain learning throughout a lifetime. However, there is another goal of education and that is the enhancement of literacy to both prepare students for their chosen field of work as well as to prepare them for dealing with the complexities of modern society.

“Biology makes a unique contribution to a liberal education by expos-

“This is a very exciting time to be teaching biology. Discoveries in biology are described almost daily on the radio and on television. These discoveries continue to improve our standard of living through their impact on our ability to cure disease, to grow food, and to more fully understand the impact of society on our delicately balanced ecosystems.

“However, as fulfilling as the promise of biology can be, its full potential can only be realized if it is understood by a biology literate public. In a political system such as ours, public opinion has a very strong influence on how the fruits of scientific research are applied. A public which lacks science literacy is unprepared and unqualified to participate in the political process through the expression of public opinion. The danger is that citizens who are not science literate may be too easily swayed by emotional arguments and are susceptible to the influence of political activists whose concerns are not based on scientific merit.

“To enhance the science literacy of the voting public, professional biologists need to engage themselves in activities which will enhance the public’s understanding of biology. If biologists and other professional scientists are to continue to enjoy public trust, the public must have confidence in our ability to provide them with reliable information and reasonable predictions.

“In the absence of literacy, the kind and level of discourse that should take place between scientists, government officials, and the public sector is greatly compromised. Non-

(continued on page 5)

“...as fulfilling as the promise of biology can be, its full potential can only be realized if it is understood by a biology literate public.”

Americans, the unique contribution of biology to a liberal education, and biology as a core requirement for every college student. The following excerpts provide a flavor of my talk.

“...While there is currently substantial debate directed towards defining an appropriate course of studies that would best serve as the vehicle for attaining a liberal education, there is general agreement that a liberal education should (i) introduce the student to the great ideas of human civilization through a study of history, literature, the arts, and sci-

ing students to the evolutionary perspective. By unifying all life and relating all living things through natural selection, Darwin’s theory of common descent deprived man of his unique place in the universe and profoundly undermined traditional beliefs and values. This central theory of biology provides a unique perspective of what it means to be human and helps answer the question of why we came to be what we are. No other branch of science can match the power of biology to explain who we are.

Effects of Our Changing Environment

Armed with an unusual assortment of research tools, including both chainsaws and sophisticated fiberoptic probes, Dr. Evan DeLucia, assistant professor of Plant Biology, is investigating how the environment influences the growth of woody plants. By understanding how trees respond to current environmental conditions, he hopes to be able to predict how they will respond to future environmental changes, especially ozone depletion and global warming.

Depletion of stratospheric ozone has been a growing concern of environmentalists worldwide, especially with the discovery several years ago of the "hole" over Antarctica. Stratospheric ozone absorbs ultraviolet (UV) radiation, so as ozone levels decrease, UV levels increase.

In humans, increased UV exposure can lead to skin cancer. In trees, those increases may interrupt photosynthetic function, leading to changes in productivity, and ultimately in the composition of plants in an ecosystem. "However, some trees, especially conifers, seem to have a built in 'sunscreen' that provides protection against UV damage," says Dr. DeLucia.

Where is this "sunscreen" located in the leaf? And is it in place throughout the life of the leaf? How much UV light penetrates the various layers of the leaf? And where does damage to the photosynthetic process occur? To simulate ozone reduction, "we have made a greenhouse into Illinois' largest suntanning salon." Using a 10-micron fiberoptic probe, he is able to penetrate a leaf, micron by micron, to determine how much UV light is

getting into each cell layer. By testing a wide variety of plants, he hopes to find answers to the above questions.

Another environmental concern is global warming. "Currently atmospheric carbon dioxide levels are approximately 350 ppm. That level is predicted to double within the next 50-100 years, due to the use of fossil fuels, industrial expansion, and clear-cutting of tropical forests." Carbon dioxide traps heat radiating from the earth and increases temperature.

"Predictions of global warming of 3-5°C mean annual temperature seem relatively minor increases, easily accounted for in daily weather changes. However, when Illinois lay under the Wisconsin glacier, the global mean temperature was only about 4°C

lower than it is now." Another related consequence of global warming is global drying—a decrease in average annual rainfall amounts in certain locations.

There has been a debate raging concerning whether atmospheric carbon dioxide levels will actually increase. Since plants use carbon dioxide as their primary source of carbon during photosynthesis, one side of the debate claims that increased levels of carbon dioxide will stimulate increased photosynthesis and increased plant biomass. Moreover, they claim that this relationship is linear—with the net result that free atmospheric carbon dioxide remains relatively constant.

(continued on page 5)

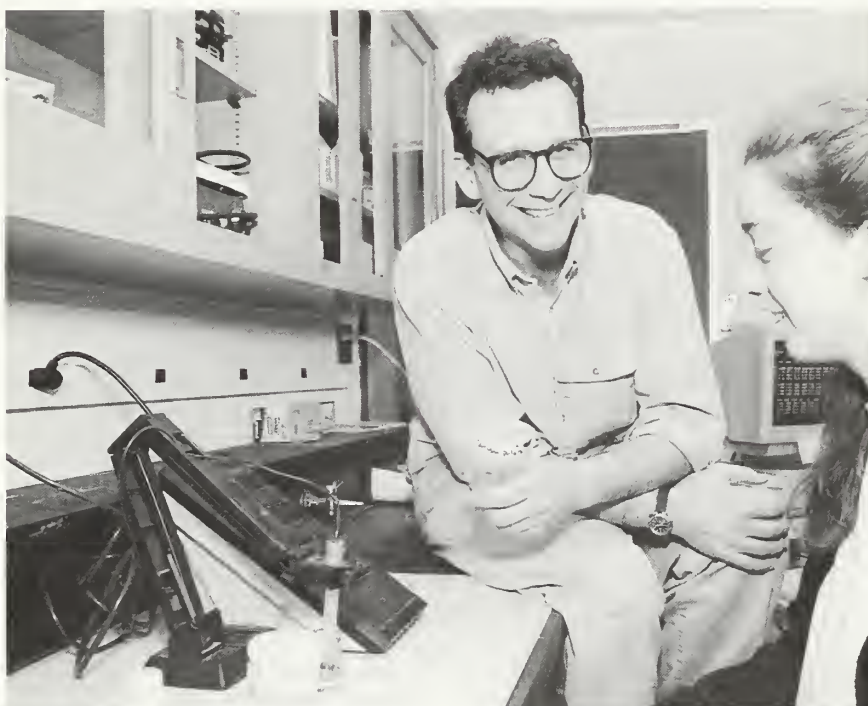


Photo by Jim Corley, B & W Photo

Dr. Evan DeLucia working in the laboratory with Tina Gonzalez, recipient of a Howard Hughes Undergraduate Research Award.

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Photo by Jim Corley, B & W Photo

Three SOLS members were recently honored at a reception hosted by Dean Faulkner for their contributions to the College of Liberal Arts & Sciences. Carolyn Corn, Administrative Assistant for Microbiology, received the LAS Outstanding Staff Award. R. Edward Dole (left), Life Sciences Teaching Lab Specialist in Plant Biology, and Paul F. Mortensen (right), Associate Director for Administrative Affairs, received LAS Outstanding Academic Professional Awards.

Zellers Scholarship for Pre-Dental Students

The family of Dr. Merebith L. Zellers has established a scholarship in his memory to support a talented life sciences' undergraduate who has selected a career in dentistry. Dr. Zellers, an alumnus of UIUC, was a dentist in Mattoon, IL.

Jacklyn Renee Kurth, a senior in the pre-medicine/pre-dental curriculum, was the first recipient of the Zellers scholarship. She is a graduate of Schaumburg High School, Schaumburg, IL.

While in high school, she worked for two years as a chairside dental assistant. She says of that experience that "...I gained a tremendous amount of experience and insight as to what being a dentist actually entails. The intensity of the detailed and technical work is counterbalanced by the warmth and assurance provided by the dentist...[My experiences] have motivated me to take on the responsibilities and challenges of becoming a dentist."▼

Effects of Our Changing Environment

(continued from page 3)

The other side of the debate argues that carbon is not the only factor limiting plant growth. At some point, the amounts of nitrogen or phosphorus will limit plant productivity. Therefore, the additional carbon dioxide will not accumulate in plants

energy and giving off carbon dioxide.

One predicted effect of global warming is that, as the environment gets warmer and drier, trees will require more woody structure to deliver water to the leaves and will, therefore, get shorter and fatter. By

grow in similar soils but at different elevations—resulting in approximately a 5°C temperature difference. By cutting down the trees and measuring how much mass is in leaves, wood, roots, *etc.*, he can begin to understand the distribution of the trees' carbon resources under different environmental conditions.

Dr. DeLucia brings his energy and enthusiasm for plant ecology and physiology, with a flair for the dramatic, into his teaching. In addition to supervising an active research laboratory with a number of graduate and undergraduate students, he recently taught the plant biology portion of Biology 121—the second course of the new three-course sequence required of all life sciences majors—to 600 students, and now perhaps 600 environmentalists.▼

“...when Illinois lay under the Wisconsin glacier, the global mean temperature was only about 4°C lower than it is now.”

and will continue to increase in the atmosphere.

Although moderate levels of global warming may not drastically affect agricultural crop production, this may not be true for woody species. Leaves use carbon dioxide in photosynthesis to produce sugars, but the woody stems and roots of trees respire, using

investing more carbon in woody tissues relative to leaves, growth of trees will decrease.

To test this prediction, Dr. DeLucia is studying how trees invest carbon. With a four-wheel drive vehicle, chainsaw, and scales, he journeys into the Sierra mountains most summers to study pine trees. The pines

The Director's Perspective

(continued from page 2)

scientists who are in a position to influence how science will be applied have a responsibility to the people they represent to be sufficiently science literate to understand what is and what is not being promised. Biologists need to convey to the public their most honest assessment of what can be reasonably accomplished through their investment. We then need to step back and allow the voting public to decide if that investment is worth it.

“In the teaching of biology, we need to ensure that our courses con-

vey biology as the vibrant, ever-changing discipline it is. Students need to appreciate that the professor is also in awe and that failure to understand is not always based on the students' failure to learn the facts.

“While there are many academic scientists who aspire to teach more, they are discouraged from doing so by the academic reward system and their need to maintain active research programs. Our faculties, college administrators, and federal agencies need to find ways to allow such faculty to more fully engage in teaching

“In the teaching of biology, we need to ensure that our courses convey biology as the vibrant, ever-changing discipline it is.”

at the undergraduate level by both recognizing the importance of teaching and through the provision of resources and a responsive reward system.”▼

► faculty updates

Janice M. Bahr, professor of Animal Sciences and Physiology, is president-elect of the Society for the Study of Reproduction.

May Berenbaum, professor of Entomology, hosted the 10th annual "Insect Fear Film Festival." This year, the 12-hour marathon film festival highlighted "...how entomologists are inaccurately portrayed in the movies...as nerds, as bumbling social misfits who otherwise couldn't find gainful employment... Entomologists nowadays are basically insect biologists, insect biochemists, insect physiologists, insect ecologists. It's not like we're all out there with a magnifying glass looking for new specimens," she said.

David Clayton, assistant professor of Cell & Structural Biology, has found that birds may be smarter than previously assumed. An article in the *Chicago Tribune* detailed his study that focused on the activity of a particular gene found in canaries, which demonstrated greater activity when stimulated.

Fred Delcomyn, associate professor of Entomology and Physiology & Biophysics, was recently awarded a National Science Foundation grant to apply knowledge of how the cockroach's nervous system coordinates leg movements to the field of robotics. The goal is to create a fully operating robot. "If we figure out how the insect does it, then this information can be transferred to the roboticists, and the roboticists can then make good robots that are easy to control."

William T. Greenough, professor of Cell & Structural Biology and Psychology, was elected to the National Academy of Sciences in 1992. His

research interests focus on neuroscience. One interesting finding is that the plasticity of the brain continues throughout life and depends on learning itself, not merely on the performance of an activity that is related to a given task.

Paul Lauterbur, professor of Chemistry, Medical Information Sciences, and Physiology, received the 1992 International Society of Magnetic Resonance Award at its triennial meeting held in Vancouver, British Columbia.

An alternative method of pest control developed by **Robert Metcalf**, professor emeritus of Entomology, was recently approved by the U.S. Environmental Protection Agency. It uses chemicals from plants to bait and then poison insects.

Stephen Portnoy, professor of Statistics and Ecology, Ethology & Evolution, was appointed as an associate in the Center for Advanced Study for the academic year 1993-94 to work on a book on statistical methods for quantile response models.

C. Ladd Prosser, professor emeritus of Physiology & Biophysics, received a Distinguished Service Award from the American Motility Society, an organization of basic and clinical scientists devoted to the study of gastrointestinal motility.

Klaus Schulten, professor of Biophysics and Physics, has provided insights into how migratory birds make it to their north- and southbound destinations. He discovered that the birds' eyes contain a chemical that may combine the earth's weak magnetic lines of force with light to produce an image, which they use as a directional guide. ▼

► in memoriam

Kimball C. Atwood III, former head of Microbiology, died October 13, 1992, in Woods Hole, MA. He was 71. He was known for his pioneering work in genetics. With colleagues Ryan and Schneider, he described "periodic selection," a basic principle of bacterial population dynamics, by presenting the first laboratory confirmation of Darwin's theory that selection was fundamental for the process of evolution. While at UIUC, in collaboration with Ritossa and Spiegelman, Dr. Atwood was among the first to realize the potential in the nucleic acid hybridization technology, which plays a central role in molecular genetics and biotechnology today. He left UIUC in 1969 and retired from Columbia University in 1987. He continued his professional relationship with the Woods Hole Marine Biological Laboratory, where he had done research and lectured almost every summer since 1949. ▼

School of Life Sciences Alumni Newsletter is published semi-annually by the School of Life Sciences, University of Illinois at Urbana-Champaign. Comments and suggestions are welcome and should be addressed to:

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Robert W. Tuveson, 1931-1992

Robert Williams Tuveson, professor of plant biology and microbiology, died at Covenant Hospital in Urbana, on October 13, 1992. He was 61.

Dr. Tuveson received his B.S. degree in biology from UIUC in 1954 and his M.S. degree in botany in 1956. After attending the University of Minnesota for a year, he transferred to the botany/genetics program at the University of Chicago and received his Ph.D. in 1959.

He obtained a teaching position at Wayne State University, Detroit, in 1959, beginning as an instructor and becoming an assistant professor of biology after one year. In 1961 he joined the faculty of the University of Chicago as assistant professor of botany, rising to associate professor in 1967.

In 1968, he accepted a position as associate professor of botany at UIUC and remained on the faculty here for the rest of his life. He was promoted to professor in the department of Genetics & Development in 1974 and joined the department of Microbiology in 1987. Among his administrative responsibilities, he served as executive officer for the biology programs from 1977 to 1981 and as head of Genetics & Development from 1984 to 1986.

He was deeply committed to teaching undergraduate biology and microbiology as well as to supervising graduate student research; at the time of his death, he was working on revisions of an introductory biology laboratory manual.

In addition to his work on campus, he was associated through visiting

appointments with Dartmouth College as an NIH Special Postdoctoral Fellow, Argonne National Laboratory as a Scientist in Residence, and the Laboratory of Molecular Genetics, NIEHS, in Research Triangle Park, NC, as a Research Scientist.

Author of over 75 scientific publications, his research focused on the effects of ultraviolet light on bacteria. He was the first person to develop mutants of *Escherichia coli* (*nuv*) specifically sensitive to longwave ultraviolet (UVA) light and contributed to a resurgence of research interest in biological effects of UVA wavelengths.



He was deeply committed to teaching undergraduate biology and microbiology as well as to supervising graduate student research...

Using these and other *E. coli* mutants he developed, he examined bacterial chromophores for absorption of UVA as well as intracellular targets for highly reactive oxygen species generated by UV in the presence of photosensitizers, including polycyclic aromatic hydrocarbons, naturally occurring plant constituents, and inorganic ions. In addition, he was interested in identifying mechanisms underlying oxidative repair in bacteria.

An active member of the American Society for Photobiology, he was slated to serve as associate editor of the journal *Photochemistry & Photobiology* at the time of his death.

Dr. Tuveson is survived by his wife Mary Ellen, his father, a brother, two sons, a daughter, and a grandson.

Memorial contributions may be made to:

*Young Scientist Travel Fund
Secretariat, American Society
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Augusta, GA 30914*

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1701 E. Main St.
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1911 E. Main St.
Urbana, IL 61801 ▼*

“Jumping” Genetics

(continued from page 1)

the two sequences from *Drosophila* and the moth. Dr. Robertson found two small conserved regions on the transposase in both species. Using these two areas as “primers,” he employed the PCR method “to fill in” or amplify the DNA between them.

What Dr. Robertson discovered is that *mariner* is very widespread. He

subfamilies have been identified. A puzzling aspect of this particular finding is that some insect species have multiple subfamilies of *mariner* present while other distantly related insects have closely related *mariners*.

For example, *mariner* in the horn fly and the mosquito *Anopheles gambiae* are very similar and yet the

tional reason for studying transposable elements is as tools for genetically engineering insects,” says Dr. Robertson. The P element, another transposable element which he has worked on, is used to genetically engineer *Drosophila*; however, it does not function in other insects. He hopes that *mariner* may be useful as a “vector” or agent to introduce selected genes that may help control a variety of insect pests, such as mosquito vectors of human diseases or the Mediterranean fruit fly.

Although these molecular studies now occupy much of Dr. Robertson’s time, he was once a more traditional field entomologist. He admits that he chose to work on the mating behavior of a particular damselfly for his Ph.D. dissertation at the University of Witwatersrand in South Africa “...mainly because I was a maniacal rock climber and this damselfly could only be found in mountain streams.” When he moved to the Midwest, he switched hobbies and is now an avid wind surfer—an appropriate “jump” for one who works with *mariner*. ▼

...they may truly be “jumping genes”—even leaping across species boundaries...

found *mariner* elements in 10 additional species, representing six additional orders, in insects as diverse as honey bees, mosquitoes, silverfish, cat fleas, and earwigs. And subsequently in about 10% of 400 species examined.

“Also we have found that *mariner* is very old, occurring in insects since their origin 200-300 million years ago—if not before.” In fact, other researchers have found *mariner*-like elements in nematode worms.

“Moreover, there are distinct kinds of *mariner* according to a phylogenetic analysis.” So far, four major

flies are in two distinct suborders which last shared a common ancestor at least 200 million years ago. The fact that similar *mariner* elements exist in such distantly related species indicates that they may truly be “jumping genes”—even leaping across species boundaries in a horizontal fashion. How this occurs and how often are still unknown.

“These transposable elements are termed selfish DNA. Much like a virus uses a host to reproduce, the evolutionary function of *mariner* is simply to make copies of itself.”

So why study *mariner*? “An addi-

Students Selected to Attend Biomedical Research Program

César Egoavil (senior in Biology General) and Vinay Singh (senior in Biology Honors) were selected to attend Phase I of the National Institute of Allergy and Infectious Diseases (NIAID) “Introduction to Biomedical Research” program. The

program was held February 7-11, 1993, in Bethesda, MD. They are both eligible to apply for Phase II, a summer-long internship at one of several NIAID sites.

For their Phase I program, NIAID selected only 55 participants from

academically superior minority students in a nationwide competition. Moreover, the maximum number of students accepted from an institution was two. ▼

► alumni news

1960s...

Mary R. Garlich Grannell, MS, (BS Biology '61) retired September 1, 1992 after 26 years of service as a science teacher/counselor in the Denver (CO) public schools. She also taught science for 4 years at Galesburg, IL.

Jarvis E. Hudson, PhD, (MS Zoology '68) is an assistant professor of biology, in the department of Natural Sciences, Fayetteville (NC) State University.

1970s...

Paul Brewer (BS Ecology, Ethology & Evolution '78) recently received The Wildlife Society's Professional Development Award for over 150 contact hours spent improving wildlife career professionalism through education, contributions to scientific literature, and participation in professional organizations. He is a wildlife biologist for the Illinois Department of Conservation in Charleston. In his "spare" time he is captain of the Lincoln Fire Protection District and received state certification as Fire Apparatus Engineer last fall. He and his wife **Kathy (Ewing)** (BS Biology '74) live in the country south of Charleston. She is a sanitarian with the Coles County Public Health Department and enjoys ballet classes and "jazzercise."

Norman C. Ellstrand, PhD, (BS Biology '74), professor of genetics at the University of California, Riverside, was awarded a Fulbright grant to conduct research this spring in Sweden on genetic factors that contribute to plant extinction. He will study how cross-breeding and inbreeding may play a role in extinction of plant species. He is also one of the nation's leading authorities on potential problems associated with agricultural biotechnology.

Cynthia A. Gates, PhD, (BS Botany '77) is a senior associate scientist in the Discovery Chemistry department of Marion Merrell Dow Research Institute, Cincinnati, OH. She is a principal investigator and project monitor for three lead compounds in their prostate cancer program.

Ronald J. Sokol, MD, (BS Biology '72) is associate professor of pediatrics, pediatric gastroenterology, and nutrition in the department of Pediatrics, University of Colorado School of Medicine and the Children's Hospital, Denver. He is also director of the Pediatric Liver Center in Denver. His research interests are vitamin E metabolism and mechanisms of liver injury.

James L. Swingler, MD, (BS '75, MS Microbiology '76) is in private practice in obstetrics and gynecology in Peoria, IL. He is also a clinical assistant professor at the UI College of Medicine in Peoria with clinical, teaching, and research interests in human papillomavirus infections and cervix cancer, colposcopy, laser surgery, and obstetric/gynecological infectious diseases.

Mary Ann Walter, PhD, (BS '73, MS Microbiology '74) is vice president of technology development for the Texas Research & Technology Foundation, San Antonio. Her duties include assessment of technology, creation of technical and marketing documents, technology transfer negotiations including licensing and research agreements, new company

formation, and the development of the Texas Research Park.

1980s...

Jerome D. Anderson, DO, Major, (BS Biology '82) was recently appointed chief resident in the USAF pathology residency training program, Willford Hall Medical Center, San Antonio, TX.

Paul P. Arquilla (BS Biology '88) earned his doctor of optometry degree in May 1992. He is a doctor at Rosin Optometrists in Aurora, IL.

David A. Brenningmeyer (BS Biology '86) is a third-year law student at the University of Maine, Portland. He is working as a legal writing instructor and is research editor of the *Maine Law Review*. He also recently received the David Santee Miller Scholarship.

William Baader, MD, (BS Honors Biology, Biochemistry '81) completed his general surgery residency at Swedish Hospital, Seattle, WA, in 1991 and is now a board certified general surgeon. He is currently a resident in plastic surgery in Akron, OH.

Kathryn Becker (BS Biology '89) was the recipient of the 1992 Terwilliger Award, which is presented by Northern Illinois University's graduate school to the graduate student who displays outstanding efforts in scientific research and a high level of academic enthusiasm. She plans to complete her doctoral work in neuroscience in August 1993.

Wally Casey (BS Biology '88) is process manager for Rhône-Poulenc-Rorer Pharmaceuticals in Kankakee, IL. He isolates and purifies factors VIII and IX for the treatment of hemophilia A and B. He married Sandi Michelson in May.



November 20, 1992

To the SOLS Alumni Newsletter:

As I begin the eighth month of my post-doctoral training at the University of California, San Francisco, I am thinking back to the years I spent in my graduate career in the department of Microbiology (fall 1986-fall 1991). UCSF is considered to be a premiere cell biology institution and therefore attracts some of the best students, faculty, and post-docs from around the world. Within my own lab there are post-docs from five countries. After several months of interactions at UCSF, I have come to realize that the graduate education I received in SOLS rivals that of any of my new colleagues, all of whom have come from other prestigious institutions. I am more grateful than ever for the solid foundation I received in classes such as MCBIO 330 (molecular biology) and MCBIO 331 (cell physiology). I also more fully appreciate the headstart I was given with a DeBoer Fellowship, and the opportunity to attend an international meeting with a Clark Research Support Grant. Furthermore, the success I enjoyed in my graduate career enabled me to receive a Helen Hay Whitney Post-Doctoral Research Fellowship.

Presently I am working in the lab of Dr. Regis Kelly attempting to reconstitute synaptic vesicle formation in vitro. Synaptic vesicles (SV's) are a population of small, homogeneous vesicles found in neurons and neuroendocrine cells that store neurotransmitters and release the vesicle contents in response to a stimulus. The biogenesis of SV's is a controversial topic, and I am currently investigating the possibility that SV's are derived from endosomes.

I am pleased to see, from the SOLS Alumni Newsletter, that SOLS is thriving. I look forward to following the continuing growth of SOLS and am proud to call the department of Microbiology at the U. of I. my alma mater.

Sincerely,
Ann Cleves
 (PhD Microbiology '92)

Melissa A. Dianovsky, MD, (BS Biology '88) recently graduated from the UI College of Medicine at Chicago. She is a first-year resident in pediatrics at the University of Chicago Hospitals.

Richard T. Dineen, MS, (BS Biology '88) is a genetic counselor with the UI College of Medicine at Peoria.

Darin J. Miller (BS Biology '88) graduated from the University of Chicago-Pritzker School of Medicine in June 1992. He was elected into Alpha Omega Alpha Honorary Medical Society and earned the Joseph A. Capps Award, which is given to a senior medical student for outstanding proficiency in clinical medicine.

Bradley R. Morgan, MD, (BS Biology '82), pathologist and director of Chemistry, Carle Clinic Association, Urbana, has been elected a Fellow of the College of American Pathologists. He is board-certified in anatomic and clinical pathology.

Dave Nelson (BS '84; MS Biology, Statistics '89) is a biostatistician in the department of Medical Research at the Methodist Hospital, Indianapolis, IN.

M. Brian Sehy (BS Biology '88) earned his doctor of optometry degree from Indiana University in spring 1992 and was the recipient of the Bausch & Lomb Award. Commissioned into the USAF as a captain, he is serving as an optometry officer at Lackland Air Force Base, San Antonio, TX.

Charles E. Siegel (BS Ecology, Ethology & Evolution '80, MS Biology '84), a PhD student at Texas A & M University, was promoted to curator of birds at the Dallas Zoo in 1991. He is also a conservation biology officer for the Amazon Conservation Fund, Inc. (based in Champaign, IL), which worked with the Peruvian government to create the 800,000-acre Reserva Comunal Tamshiyacu-Tahuayo.

David M. Stone (MS Entomology '84), teaching associate at University High School, Urbana, IL, was recently awarded the Entomological Society of America President's Prize for Entomology at the High School Level.

Bruce Thompson (PhD Genetics & Development '87) is senior staff fellow in the Clinical Diabetes and Nutrition section of the National Institutes of Health. He resides in Phoenix, AZ.

Michael Unger, MD, (BS Biology '87) is a first-year resident at St. Francis Medical Center in Peoria, IL, in combined internal medicine and pediatrics.

1990s...

Intan Ahmad (PhD Entomology '92) is a faculty member in the department of Biology and the Inter-University Center for Life Sciences, Institut Teknologi Bandung, Bandung, Indonesia.



Frank W. DeLaurentis (BS Biology '91) is a mental health worker in the Child Psychiatric Unit at Lutheran General Hospital, Park Ridge, IL. He plans to enter Loyola University Stritch School of Medicine this summer.

Sandee Feldman (BS Biology '91) graduated from Medical Technology School at National-Louis University in July 1992 and received MT (ASCP) certification in August. She is working in the hematology laboratory at Evanston Hospital, Evanston, IL.

Gina Hanfland (BS Biology '91), a veterinary student at the UIUC College of Veterinary Medicine, received an award for academic excellence during spring ceremonies in 1992.

Catherine A. Haraldsson (BS Biology '92) is working towards certification in Nuclear Medicine Technology. She will graduate in August.

Marnie Hofbauer (BS Biology '90) received first place in the sophomore class at Southern Illinois University School of Dental Medicine's annual student table clinic research competition in spring 1992. She represented SIU at the national research competition in Chicago in February 1993.

David T. Rubin (BS Honors Biology '90) is a third year student at the University of Chicago-Pritzker School of Medicine.

Susan Tucker Smith (BS Biology '91) is in the nursing program at Loyola University. She and her husband live in Wood Dale, IL. ▼

► in memoriam

James B. Kelly (BS Biology '87), a captain in the U.S. Marine Corps and a veteran of the Persian Gulf war, died May 29, 1992, when he ejected from an F-18 fighter plane over the jungles of Malaysia. He had logged 70 hours of combat time in the Gulf war and received four medals for his work, including the Navy Commendation Medal and an Air Combat Medal. He developed his interest in flying while at UIUC. He attended Marine Corps Officer Candidate School at Quantico, VA, and completed his flight training at Pensacola, FL. ▼

► let us hear from you

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Governor Edgar Releases Building Funds

Governor Jim Edgar, in a campus news conference on January 26, 1993, announced the release of \$56.3 million in construction funds to build the new Chemical and Life Sciences Laboratory.

"The construction of a chemical and life sciences lab here on the Champaign-Urbana campus of the University of Illinois will permit the University to remain at the forefront of education of the nation's top chemists, biologists, and chemical engineers," Governor Edgar said.

University President Stanley Ikenberry added, "We've got a commitment to build a bridge linking some of the strongest chemical and life sciences programs in the world.

This grows out of a rich tradition whose underlying importance lies not only in what's gone on in the past, but what will come in the future."

The new building will span almost two blocks along Goodwin Avenue, across from Krannert Center for the Performing Arts, and will be linked by walkways to Roger Adams Laboratory, Morrill Hall, and the Medical Sciences Building.

The building will house faculty from both the Schools of Chemical Sciences and Life Sciences, some of whom are housed in "60- to 90-year-old space that is the poorest place on campus for high-level research," according to Chancellor Morton Weir. "The research [of the two

disciplines] is growing closer together; this building will physically allow interactions that are already taking place intellectually."

Groundbreaking ceremonies are anticipated this spring and building completion is projected for fall 1995. State funding for the project comes from the sale of bonds which must be used for capital development projects.

"Our educational infrastructure is an investment in our economy and in our future," Governor Edgar said. "Good classrooms and modern facilities are essential to assuring that Illinois will have a competent and competitive work force for the remainder of the 1990s and well into the coming century."▼

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School of Life Sciences

alumni newsletter

fall 1993

Studies of Bees' Brains Could Shed Light on How People Learn

by Jim Barlow

Can honey bees help scientists understand how adult humans learn? Researchers in the School of Life Sciences are convinced they can.

In the July 15 issue of *Nature*, they describe structural changes that occur in the brains of bees when the insects leave their domestic chores to tackle their most challenging and complex task—foraging for pollen and nectar.

As part of her doctoral thesis, neuroscience graduate student Ginger S. Withers focused on the “mushroom bodies,” a region of the insect brain so named because it appears mushroom-shaped when viewed in cross-section. The region is closely associated with learning and memory.

Withers used quantitative neuroanatomical methods to study sections of bee brains to show that the mushroom bodies are reorganized when a bee becomes a forager. Although a honey bee typically switches from hive-keeping tasks, such as rearing younger sisters and caring for the queen, to foraging at about 3 weeks of age, the brain changes are not simply due to aging. In a key experiment, young honey bees were forced to become foragers by removing older bees from the colony. The mushroom bodies of the precocious foragers, who were only about



Photo by Jim Corley, B & W Photo

(continued on page 7)

Dr. Susan Fahrbach with a *Manduca* caterpillar.



Dear SOLS Alumni,

The School of Life Sciences sends our Alumni Newsletter to over 12,000 of you twice a year, which on the surface presumes that we know where you are and maybe even what you are doing. But when we were recently asked by some granting agencies to come up with statistics on our alumni, it became painfully obvious that we really didn't know what happened to many of you. Where did you go after graduation? More importantly, where are you now and what are you doing? We really are interested!

So I appeal for your help. We have replaced our "Let Us Hear from You" section of the newsletter with an expanded Alumni Survey (pages 11 and 12). Please take a few minutes to complete the survey and return it to us. Also, if you will leave your mailing label attached, we will know if the Alumni Association has your correct address.

We would also like to highlight your activities and achievements in a future issue of the newsletter—so please feel free to enclose a picture, a news clipping, etc.

Let me take this opportunity to also thank all our alumni and friends who generously contributed during our annual fund drive (see pages 4 and 5). Your new and continuing support is very important to the School.

I look forward to hearing from you!

Sincerely,

Jordan Konisky, Director

Construction has begun on the Chemical and Life Sciences Laboratory, although above-average precipitation this summer and fall has slowed progress. The building should be completed in 1995.

The School of Life Sciences Alumni Newsletter is published semi-annually by the School of Life Sciences, University of Illinois at Urbana-Champaign. Comments and suggestions are welcome and should be addressed to:

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Photo by Jim Corley, B & W Photo

Computer Software Brings Life to Dynamic Processes

With some new computer software, Life Sciences students can better address the dynamic process of protein synthesis. "Protein synthesis is one of those complex biological processes that can either be glossed over in a course or described in 'gory' detail," said Dr. Carol Muster, director of the Honors Biology program. "In my cell biology course I wanted to go beyond a series of chalk drawings or a film strip and have students become more intimately involved with the process."

Through the assistance of the SOLS' Educational Technologies Center and computer engineering undergraduate student Frank Beier, Dr. Muster developed a software program that does just that. "I developed a story board of what I wanted the program to do, and Frank implemented the programming for me. That assistance allowed me to be a software developer without becoming an expert software programmer."

The software uses cartoon images to lead students through the process of making proteins. They can stop the process at each "stage" of synthesis or the program can be run uninterrupted. "Because of the way we have traditionally described the process to students, they believe it takes a long time for the cell to make a protein. In actuality, protein synthesis may add five amino acids per second. The software can play out the process in real time."

The software also has some other "bells and whistles"—or rather "bangs" as energy is used—to make the program fun for students. And if they don't quite remember what some-

thing is, there are easily accessible review sections.

This software is interactive and allows students to build their own proteins by typing in a nucleotide sequence, which the software translates as the cell would. Students can alter their nucleotide sequence to see the effects of mutations on the amino acid sequence of the protein. "By using this software as a lecture aid and a tutorial, the students seem to grasp the process better."

In fact, the software was so successful that Dr. Stanley Maloy, associate professor of Microbiology, has begun using it in Biology 122 (a core course serving 500+ biology undergraduates a semester).

The computer facilities available in the School of Life Sciences facilitate such efforts. "Honors Biology has

three computers for their exclusive use and SOLS has an open computer lab for all its students. The software can also be made available to remote sites, such as dorms."

Dr. Muster finds such use rewarding. "It helps make the 3-4 months of development time seem worthwhile." So worthwhile that she has been working on a genetic recombination computer program and a tutorial for analysis of DNA using restriction enzymes.

As an aside, Dr. Muster wanted all Honors Biology alums to know that the program is no longer housed in the basement of Harker Hall. "Instead of the dark, dreary labs of Harker where dirt blew in around the windows, we now have beautifully renovated facilities on the third floor of the Natural History Building."▼



Dr. Carol Muster

Photo by Jim Corley, B & W Photo

**thanks to our alumni and friends who
generously contributed to the SOLS' 4th
annual fund drive!**

\$14,290 pledged; \$13,965 received as of 8/31/93
286 pledges from alumni during the phon-a-thon
Your gifts supported

- the Biology Library Endowment
- the SOLS Enhancement Fund



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► faculty updates

Janice M. Bahr, professor of Animal Sciences and Physiology, received the Merck Award for Achievement in Poultry Science. The award of \$1,500 and a plaque is given to an individual annually for distinctive contributions to the advancement of poultry science.

May Berenbaum, professor of Entomology, was named a Jubilee Professor by the College of Liberal Arts & Sciences. This award honors faculty for their contributions to teaching, research, and scholarship.

The following promotions were approved by the Board of Trustees: **Philip M. Best** to professor, Physiology & Biophysics and College of Medicine; **Evan H. DeLucia** to associate professor, Plant Biology; **Martha U. Gillette** to professor, Cell & Structural Biology, Physiology, and College of Medicine;

Stephen J. Kaufman to professor, Cell & Structural Biology and College of Medicine; and **Hugh M. Robertson** to associate professor, Entomology.

Evan H. DeLucia, associate professor of Plant Biology, was awarded a Bullard Fellowship from Harvard University to conduct research in plant ecology at the Harvard University Forests while he is on sabbatical in 1994. He will examine the physiological and architectural mechanisms of shade tolerances in hardwood tree seedlings in both field and growth chamber experiments.

Cell & Structural Biology is honored to have added **Vladimir Gelfand** to its faculty in late September as a full professor. He is "... an internationally acclaimed scientist in the field of cytoskeletal structure and function," said A.F. "Rick" Horwitz, head of the

department. "His accomplishments are even more outstanding when one understands the relative scientific isolation [at the Institute of Protein Research in the Academy of Sciences in the former USSR] in which he managed to make these major contributions."

Benita S. Katzenellenbogen, professor of Physiology and Cell & Structural Biology, was named a fellow by the American Academy of Arts & Sciences. She was honored for her research and leadership role in endocrinology and her observations of progesterone and estrogen actions in uterine cells. Her work on cell proliferation and cancer has led to important insights into biochemistry and molecular action in cells. She said the honor is "particularly nice, because the Academy is made up of scholars from all disciplines."

Mark E. Nelson, assistant professor of Physiology & Biophysics, was named as one of three Beckman Fellows in the Center for Advanced Study for 1993-94. The appointment recognizes outstanding younger faculty who have made distinctive scholarly contributions to the sciences, and provides release time for creative work on self-initiated programs. He will be working on adaptive signal processing and motor control of sensory acquisition in electrosensory systems of weakly electric fish.

Don Ort, professor of Plant Biology, was selected Senior Research Scientist of the Year for the Midwest Area by the USDA Agricultural Research Service.

Gene E. Robinson, assistant professor of Entomology, will receive the 1993 J.I. Hambleton Award for Outstanding Research by the Eastern Apicultural Society. ▼

SOLS Graduate & Undergraduate Student Awards, May 1993

Robert Emerson Award: *Susan M. Aronica (Physiology & Biophysics)*

Procter & Gamble Fellowship: *Mark J. Kuenzi (Physiology & Biophysics)*

Edwin M. Banks Memorial Award: *Steven J. Harper (Ecology, Ethology & Evolution)*

Francis M. & Harlie M. Clark Summer Grant: *Sarah J. Janssen (Physiology & Biophysics); Shawna L. Naidu (Plant Biology)*

Francis M. & Harlie M. Clark Research Support Grant: *Rosanna Giordano (Entomology); Eric M. Horn (Neuroscience); Patrick C. Nolan (Neuroscience); Michael E. Retzer (Ecology, Ethology & Evolution); Kimberly J.N. Seidman (Neuroscience)*

Award for Outstanding Teaching in Microbiology: *Laura M. Hales*

Award for Outstanding Teaching in Plant Biology: *Aruna Khashnobish*

SOLS All-School Distinction Award: *David K. Cortez (Biology Honors)*

SOLS Director's Award: *Herschel D. Wallen (Biology Honors)*

Helen E. Hess Award: *Natasha N. Leacock (Biology Honors)*

Harriett Long Award: *James C. Vary (Biology)*

Harvey L. Pretula Memorial Scholarship: *Kelly Ann Breiner (Microbiology)*

Dr. Meredith L. Zellers Scholarship for Pre-Dental Students: *Jacklyn R. Kurth (Biology)*

Clark Microbiology Outstanding Research Achievement Award: *Adam J. Toguchi; Janet L. Roggy; Shelli M. Seebruch*

Clark Microbiology Award for Senior with Best Academic Record: *Shelli M. Seebruch*

Bee Brains and Learning

(continued from page 1)

1-week old, mirrored those of normal-aged foragers.

The findings suggest that nerve cells in the mushroom bodies receive more informational inputs per cell as the bee learns to forage. To be a successful forager, a bee must learn how to navigate to and from its hive and how to collect food efficiently from many different types of flowers.

The implications for neuroscience go far beyond the beehive, said co-authors, Susan E. Fahrbach and Gene E. Robinson, both assistant professors of Entomology. There could be application to human studies, because the structure of bee brains is similar to—but much simpler than—human brains.

Fahrbach, whose research has focused on the impact of hormones on the nervous system, was drawn to the honey bee by its sophisticated behavior, small brain, and power of concentration. “Honey bees offer an exceptionally powerful model for the study of changes in the brain related to naturally occurring changes in behavior, because, once a bee becomes a forager, it does nothing else. Because the behavioral shifts are so complete, the change in brain structure that accompany the behavioral transitions must be related to the performance of the new observed behavior,” she said.

Robinson, who is director of the UI’s Bee Research Facility and who

has studied other physiological and genetic aspects of bee behavior, agrees. “This discovery opens a new area of research on the relationship between brain and behavioral plasticity. One fundamental question this research raises is ‘which comes first?’ Do changes in behavior lead to changes in brain structure? Or do the changes in brain structure occur first, in preparation for the changes in behavior?”

As researchers pursue the changes in brain cells that form the underpinnings of learning, these scientists say the combination of neuroscience and entomology may yield sweet rewards. ▼

—Reprinted from *Inside Illinois*

Collaboration Keeps Things Buzzing

Susan Fahrbach credited collaboration with the progress that was made relating changes in behavior with changes in the anatomy of the bee brain. “The scientific questions unified us and drew on our talents and skills,” she commented. “I didn’t need to become a beekeeper or expert on all phases of bee behavior, while Gene Robinson didn’t have to spend time making anatomical preparations.”

Honey bees have been studied for a long time and their structured social behavior is well known. Moreover, the basic anatomy of the bee brain was described over a hundred years ago. “What we did was to approach the subject with more sophistication. We redid the anatomical studies using powerful new methods recently developed for the study of vertebrate brains. We were also careful to focus on bees exhibiting specific behaviors. We know that brain structure changes

when other animals, such as laboratory rats or song-birds, learn. We were able to detect striking anatomical changes in the bee brain for each behavior and stage on a one-to-one basis.”

This set of experiments, in which behavior of the animal drove the scientific hypotheses, is in sharp contrast to Dr. Fahrbach’s other primary area of research. For a number of years, she has been studying the hormonal regulation of the number of neurons during metamorphosis of the moth *Manduca*. As *Manduca* changes from caterpillar to pupa to moth, neurons die. What sequence of chemical and biochemical events occurs when neurons die? And what regulates neuronal death? These questions have occupied much of her research efforts, and are focused at the cellular level. “I don’t really care about the rest of the animal. In fact, we mainly culture one motoneuron, which is then used as a model system for the study of cell death.”

“But working with the bees gave me an opportunity to use some of my early training in physiology and behavior.” Dr. Fahrbach, who has a B.S. degree in both Psychology (from the University of Pennsylvania) and Physiology (from Oxford University), did her Ph.D. work in neuroscience at Rockefeller University on the hormonal control of parental behavior in rats. “Relating specific behaviors to single neurons in rats was very difficult due to the complexity of the mammalian brain, so I switched to a more accessible system—insects.”

Dr. Fahrbach is noted not only for her research, including being a Sloan Foundation Fellow, but also for her teaching. She shares her excitement about biology with approximately 250 undergraduates each fall as instructor of Biology 104, animal biology for non-majors, and was recently recognized by as a 1993 Vice-Chancellor’s Teaching Scholar. ▼

► alumni news

Parmalee received 1991 Fryzell Award for Interdisciplinary Research from the Society for American Archaeology

Recent years have witnessed a substantial increase in attention paid to faunal remains recovered from archaeological contexts. But for nearly 40 years, Paul Parmalee (MS Zoology '49) has been identifying and reporting on animal bones from archaeological and paleontological sites throughout North America. As a pioneer in the field, he has set standards for excellence in basic taxonomic identification, and has provided detailed analyses of faunal remains from numerous archaeological and paleontological contexts.

Trained as a zoologist, his career in zooarchaeology did not begin until the mid-1950s when, as curator of zoology for the Illinois State Museum, he became interested in the archaeologically recovered fauna from Modoc Rock Shelter in the Central Mississippi River valley. It was at this point that Paul became aware of the need to develop relatively specialized comparative collections if credible identifications were to result. His resolve, that any interpretation of faunal remains must begin with accurate identification and that accurate identification must proceed with the aid of comprehensive, comparative collections, has, if anything, strengthened over the years.

During his 20-year tenure at the Illinois State Museum, Parmalee published on the fauna from over 50 archeological sites in the Midwest and the Southeast. In 1973 he accepted a faculty position in Anthropology at the University of Tennessee-Knoxville where he taught classes in zooarchaeology until 1978, when he became director of the University's Frank H. McClung Museum. In 1989 he formally retired. While at Tennessee he authored or coauthored over 60 scientific publications.

In 1990 Parmalee was formally honored for his accomplishments in zooarchaeology at the Sixth International Council for Archaeozoology in Washington, D.C. In 1991 he was presented with a festschrift entitled, "Beamers, Bobwhites, and Blue-Points: Tributes to the Career of Paul W. Parmalee," which was published jointly by the Illinois State Museum and the University of Tennessee. Papers contained in his festschrift, as well as papers presented in his honor at the Society for American Archaeology's 1991 Fryzell Symposium in New Orleans, reflect the varied research that has typified his career. His "retired" status promises to increase his productivity now that administrative and teaching obligations are not competing for his time.

—Excerpted from *American Antiquity* 57:10-11 (1992).

1950s...

Marvin G. Moose, PhD, (BS Biology '58) is founder and president of Ameri-Pac, Inc., St. Joseph, MO, which has been packaging animal nutritional products and all-natural lawn and garden products since 1985.

1960s...

Jo Ann Orr Arnett (BS Biology '68) received a BA in Music as a trombone major from California State University, Northridge, in May 1993.

William "Bill" J. Keppler (MS Biology '61, PhD Genetics '65), professor of genetics, completed 5 years as dean of the College of Health, Florida International University, Miami. Although an administrator, he still finds time to teach every semester in the honors program about the human genome project.

1970s...

Brian Jay Bielema, MS, (BS Zoology '71) is conducting seasonal research on the life history of the timber rattlesnake in northwestern Illinois. He is attempting to promote conservation and preservation of this species and its remaining habitats throughout Illinois and Iowa.

James P. Borgstede, MD, (BS Biology '70) was awarded the Outstanding Clinical Radiologist Award for 1991-1992 by the faculty and residents of the University of Colorado Health Science Center in Denver for his excellence in teaching. He has been a clinical instructor in radiology there since 1979. In July 1992, he, his wife **Martha (Boyle)** (BS Teaching of Biology '70), and their two daughters spent 3 weeks as medical missionaries at the Silliman University Medical Center, Dumaguete City, Philippines. He purchased and installed diagnostic ultrasound equipment and then trained their radiologist, while his

family performed volunteer work in the hospital. The hospital administrator at Silliman University Medical Center is Lina M. Cortes, who received her MBA in 1971 from UIUC.

Robert A. Bressman, DDS. (BS Biology '74), an authority on dental implant surgery and research, was named chairman of professional education for the Dr. Robert Mathys Foundation, University of Florida, Gainesville, in January 1993. The Foundation provides on-going research and development in restorative dentistry and maintains a close cooperation with dental practitioners and technicians as well as industry. He was chairman of periodontics in the Illinois Masonic program, Chicago.

Deborah B. DiPietro (BS Zoology '75, MS Ecology Education '92) is an environmental education specialist at the Anita Purves Nature Center, Urbana, IL.

Michael N. Melampy (PhD Ecology, Ethology & Evolution '78) received tenure at Baldwin-Wallace College, Berea, OH, in April 1993. He heads their environmental education/awareness program and coordinates their overseas studies program in Latin America.

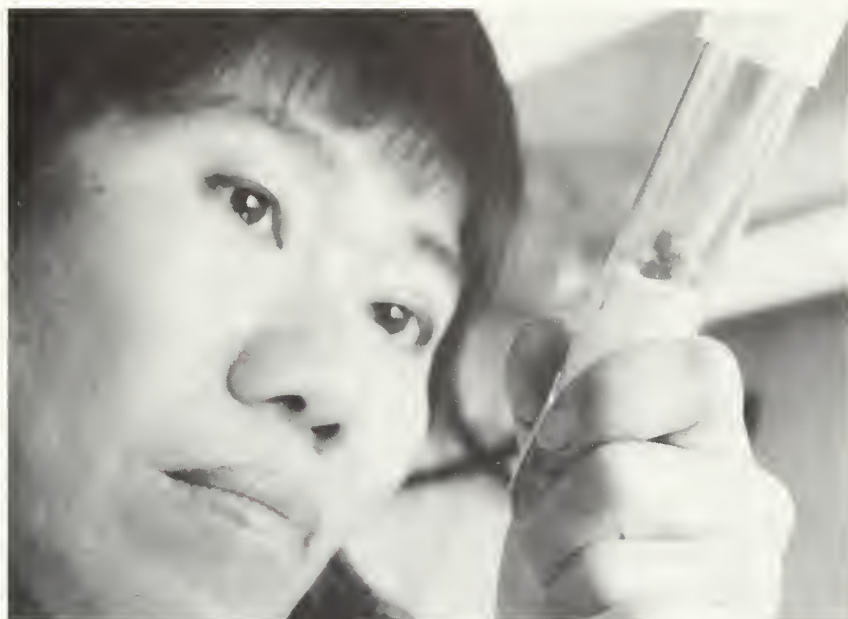
Richard E. Melcher, MD, PC, FAAFP, (BS Biology '71) is in private practice in Augusta, GA.

Duncan C. Sauer, MD, (BS Biology '72) is a doctor of emergency medicine in Tucson, AZ. He is a member of the American Board of Emergency Medicine and the American College of Emergency Physicians.

Jeffrey R. Weake, DMD, (MS Physiology '77) writes, "Hi to all physiology majors I shared time with in the lab and teaching anatomy! I married an OT student and have twins (a boy and a girl) and another girl. We are living in the country where I have a dental practice. I

would love to hear from you." His address is PO Box 806, 142 Main St., Groton, MA 01450-0806.

Alan Zucker, MD, (BS Biology '74) is in private practice in obstetrics/gynecology in Lombard, IL.



Test Tube Tomatoes: Best of What's New

Betty Kazuko Ishida's (PhD Biology '70) research with unusual test tube tomatoes has won her a "Best of What's New" award for 1992 from Popular Science magazine. The magazine's editors choose each year's 100 outstanding scientific achievements, products, and technologies, and feature them in a cover story in the year-end issue.

In her laboratory at the USDA Agricultural Research Service's Western Regional Research Center, Albany, CA, Dr. Ishida caused the calyx—the green circlet where the stem meets the tomato—to ripen and turn as red and juicy as the tomato fruit itself.

Her research brings scientists a step closer to discovering the natural mechanism that triggers tomato cells to ripen. That discovery could lead to high-tech indoor farming for the 21st century. Instead of traditional farming techniques, growers could tend, ripen, and harvest billions of fruit and vegetable cells, such as tomato cells for paste, salsa, catsup, or soup.

—Contributed by Marcia Wood, USDA Agricultural Research Service

1980s...

Tom Brauer (BS Biology '88, MS '90), a third-year veterinary student at UIUC College of Veterinary Medicine, received the Illinois Arabian Horse Association Award for academic ability

and demonstrated equine interest and experience.

David Brenningmeyer (BS Biology '86) graduated summa cum laude in May



from the University of Maine School of Law, where he was a legal writing instructor and served as research editor of the *Maine Law Review*. He began work this fall as an associate with

the Portland law firm of Pierce, Atwood, Scribner, Smith, Allen & Lancaster, where he practices environmental law. Before law school, he was a wildlife biologist with the SIU-Carbondale Cooperative Wildlife Research Laboratory.

Catherine R. Carow, PhD, (BS Genetics '86) is a postdoctoral fellow in Pediatric Oncology at the Johns Hopkins Cancer Center. Her research focuses on the molecular biology of hematopoiesis. She received her PhD degree in 1992 in Microbiology & Immunology from the Indiana University School of Medicine.

Jim Caruso, MD, (BS Biology '84) is a diving medical officer in the US Navy. He was recently promoted to Lieutenant Commander and will begin 4 years of training in pathology and hyperbaric medicine at Duke University next spring.

John A. Costello, MD, (BS Microbiology '88) is a first-year resident at the University of Washington in Anesthesiology. He graduated from the University of Illinois College of Medicine with ADA membership and as a James Scholar for Independent Study.

Lisa Lullo (BS Biology '89) was awarded a Dr. J.E. Salsbury Scholarship at the UIUC College of Veterinary Medicine's annual awards program in April 1993. She graduated in May and joined the Naper Ridge Animal Clinic,

Naperville, IL, to work with small animals and exotics.

David Mead (PhD Physiology '86) is vice-president and director of CHIMER_x, a molecular biology research company in Madison, WI.

Scott C. Morgan, MD, (BS Biology '89) is a urology resident at the University of Colorado Health Sciences Center, Denver. He married Janel Beaty, a graduate of Illinois State University and a second grade school teacher, on June 12, 1993, in Bloomington, IL.

Nancy L. Scott, MBA, (BS Biology '83), implementations representative of Enterprise Systems, Inc., Wheeling, IL, was admitted to nominee status in the American College of Healthcare Executives in March 1993. Nominees of this Chicago-based international professional society must demonstrate their educational preparation and commitment to healthcare through an extensive application process. She has been employed in the healthcare field for over 7 years.

Margaret A. Weck, PhD, (BS Biology '80), married Dr. James G. Laing in St. Louis on May 22, 1993. She teaches biology at the St. Louis College of Pharmacy and her husband is a postdoctoral Markey Fellow doing biochemistry research at the Washington University Medical Center.

Kenna Youngblood, PhD, (BS Microbiology '88) is a postdoctoral fellow at the University of California, San Diego, and is conducting research in cardiovascular pharmacology.

1990s...

Lisa C. Halliday (BS Biology '91) received a CVM Award for Academic Excellence during the UIUC College of Veterinary Medicine's award ceremony in April 1993.

Andrea Krzyzaniak (BS Biology '91) is a second-year student at the Scholl College of Podiatric Medicine, Chicago.

John Schulz (BS Microbiology '90) is a research scientist for the AMOCO Research Center in Naperville, IL. He is involved in the production of chromosome painting probes used in fluorescent *in situ* hybridization analysis. ▼

► in memoriam

William W. Hounshell (BS Biology '82), 31, died July 29, 1992. He obtained his doctorate in dental surgery at UIC Dental School and was in private practice in Peoria. He is survived by his wife Julie.

Harry "Pat" McDonald, MD, (BS Biology '75) died July 23, 1992, in Gillette, WY. A 1979 graduate of UIC Medical School, he completed his residency as an orthopedic surgeon in 1984 at Rush Medical Center/St. Luke's Hospital, Chicago. He had practiced at the Bone & Joint Clinic in Gillette for the last 8 years. He is survived by his wife Julie.

James R. Smail (PhD Zoology '65), biology professor at Macalester College in St. Paul, MN, died February 24, 1993. He was an authority on marine science, especially the ecology of coral reefs. He did extensive field work in both Florida and Hawaii. "Jim Smail represented all that is good in a liberal arts faculty member," said Mark Davis, professor and chairman of the college's biology department. "To the many biology students who went on to medical school and other graduate programs, ...Jim was a very special teacher, adviser, and friend." He is survived by his wife Mary, a son, and a daughter. ▼



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Current activities

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School of Life Sciences

alumni newsletter

fall 1994

Emerson's Legacy: Excellence in Research and in Life

Robert Emerson, born in 1903 into a distinguished New England family, was a dedicated, hard-working man of strong convictions who helped to establish UIUC as a world leader in photosynthesis research. And on the 35th anniversary of his death, his legacy is still very much alive and well.

Emerson, trained at Harvard University and the University of Berlin, made his first important contribution to photosynthesis in 1932 while at the California Institute of Technology.

Step back to that time for a moment. According to Jack Myers, "photosynthesis is a green box. We know there are two kinds of chlorophyll, *a* and *b*. We naturally suppose that all Chl *a* molecules are alike and all do photochemistry. We know nothing more of the machinery or how it works."

In collaboration with William Arnold, then an undergraduate student in physics, Emerson carried out experiments on photosynthesis in flashing light. These '1932 experiments' showed that "photosynthesis involves a light reaction not affected by temperature and capable of proceeding at great speed, and a dark reaction dependent on temperature, which requires a relatively long time to run its course."

Emerson and Arnold also determined that, for each molecule of

carbon dioxide, about 2480 molecules of chlorophyll were involved per flash of light. This later became known as the 'photosynthetic unit.'

Because these results were so far out of synch with the thinking of the times, it took over 20 years for them to be accepted at face value.

In 1947 Neil Stevens, head of botany at UIUC, invited Emerson to organize a research laboratory on photosynthesis. Emerson asked that Eugene Rabinowitch be appointed co-director, and thus began one of the most important centers in the world for education and research in

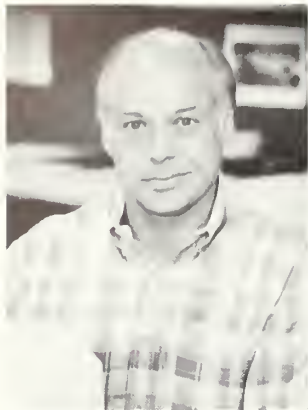
photosynthesis. It has produced four researchers elected to the National Academy of Sciences, including Emerson.

From these early beginnings, the UIUC photosynthesis unit was an interdisciplinary effort. Emerson, the plant physiologist, and Rabinowitch, the physical chemist, recognized the benefits of applying the physical sciences to the study of biological problems, and worked hard to introduce a biophysics doctoral program in the 1950s.

Today, an interdisciplinary approach is still very important in the



Robert Emerson, April 1955



The Director's Perspective — Donald R. Ort

When asked to write this column, I was immediately intrigued by its title, since my "perspective" has changed on so many things about the School during my first months as Interim Director. In particular, the dramatic change in my perspective on the significance of development and private gifts to our missions and in sustaining excellence alerted me to how little appreciated this may be by many alumni.

The University of Illinois is no longer a publicly-funded institution; rather it is public-assisted. The State of Illinois currently funds only 32% of our expenditures. Let's look at two areas in our challenge to maintain excellence: faculty and graduate students.

In every search for a professorial position, our goal is to attract the brightest and best. What does that take? In the biological sciences, a start-up package for an assistant professor, which includes a competitive salary, summer support, remodeled or new facilities, equipment, technical assistance, and supplies, is easily \$350,000. Attracting excellent faculty is only the beginning. We also must retain them and encourage their activities in quality research and education.

For every PhD student we accept, our commitment has been to provide continuing support throughout their graduate training. Since most doctoral programs take about 5 years to complete, we will invest \$95,000-\$130,000 in each student in just stipends and tuition and fee waivers.

Much of the shortfall between available state funds and actual costs comes directly from federally funded research grants and awards, or the "overhead" they generate.

However, recently the University of Illinois announced a major capital fund drive to raise \$1 billion by the end of 1998. A primary focus of this drive is to establish endowments to create named professorships and lectureships, distinguished chairs, and graduate fellowships. Clearly the success of this initiative would have far-reaching effects on maintaining our current areas of excellence and in fostering new ones.

The importance of major gifts to an academic unit is easy to grasp and appreciate. Much less intuitive in my view is the importance of smaller gifts to our educational and research missions. Take for example, the SOLS Enhancement Fund.

"...the flexibility to promote and reward excellence...depends almost exclusively on gifts from our alumni and friends."

At a reception honoring Jordan Konisky for his service as Director, Stanley Maloy thanked SOLS for paying the tuition for graduate students to participate in cutting-edge courses at such institutions as Woods Hole, Cold Spring Harbor, and the Organization for Tropical Studies. These courses are not only valuable to individuals in advancing their studies, but to the School and University as well as they share newly learned techniques with others.

These comments were seconded by Kurt Potgieter, a graduate student in Plant Biology who received Enhancement Funds to attend a tropical systematics course offered by OTS in Costa Rica. He wrote me that, "This experience was a turning point in my educa-

tion as it strengthened my goals of becoming a tropical systematist, and taught me how to begin investigating available taxa. The opportunity... allowed for an early and important evaluation of the feasibility of my thesis project. I am happy to report that it is full steam ahead!"

He goes on to say, "I write to explain what the experience meant to me with the hope that it will encourage future support for additional students." The funds that made this experience, and other similar ones, possible were given by our alumni and friends during annual fund drives.

Each year SOLS presents a number of graduate student awards from the Emerson, Clark, and Banks endowments. The fact that we do not have similar programs for our best undergraduates is a serious deficiency. We should be recognizing and promoting

exceptional accomplishments by our undergraduates.

As a step in this direction, we now have the M.L. Zellers Scholarship for Pre-Dental Students, established in memory of an alumnus. In addition, a focal point of our annual fund drive will be to bolster the Robert Emerson Endowment to add an undergraduate scholarship.

My awakened perspective about what makes SOLS run is that the State pays the "power bills," federal grants help with our operations, but the flexibility to promote and reward excellence, the distinguishing feature of great universities, depends almost exclusively on gifts from our alumni and friends. ▼

Computers revolutionize scientific art

A former elementary school teacher, Carol Kubitz became a scientific artist for the School of Life Sciences more by happenstance than by design.

After many years as a part-time teacher and mother, she accepted a challenge presented by an agronomy professor who was looking for someone to produce some technical art. She tried it and never looked back.

Kubitz embarked on this career path gradually. "I just trained myself," she said, adding that it helped to have studied not only art, but some science, in college.

Kubitz, who has worked full-time for SOLS since 1985, together with Joan Apperson, Edwin Hadley, and Molly Scott, produces a variety of graphic materials for faculty and students in the School.

Graphs, flow charts, diagrams, drawings, and posters are among the materials the artists are most often asked to design. Now that they can produce colored slides from computer-generated images, the artist service is handling an increasing number of these requests.

Typically, the artists receive project assignments directly from professors, and often work closely with them. Most often, faculty members bring in a rough sketch of what they want, or they supply the data and provide a general overview.

"Professors will come here and sit with us while we work," she said. "That way, we can move things around until they get just what they want. It ends up being a collaborative effort."

As has been the case in many fields, computers have "completely revolutionized this business." It's a rare job that takes Kubitz or the other artists back to the drawing board. "Our pens have dried up."

At first, the switch from pens to pixels was slightly "scary." But she adapted quickly.

"It was exciting doing things we never dreamed of doing. I can't tell you how dramatically this has changed the way we operate. If a professor says, 'I need that tonsil to be a bit larger,' we can change it in no time. Before, we were talking about hours and hours."

Kubitz concedes that the kind of work the artists are asked to produce doesn't require the application of exceptional creative skills.

"But you do need a strong sense of design, and you have to be accurate and careful. The first thing to keep in mind is always, 'Is the science correct? Are the numbers right?'"

"I get the most satisfaction out of the job when I get a really complicated piece of work that takes a bit of thought...when you feel like you've been stretched and pushed."

The real reward, Kubitz said, comes "when a professor you've worked with says, 'This is neat'



Carol Kubitz

Photo by Bill Wiegand

and literally gives you a pat on the back."

But up until that point, when the clock is ticking and deadlines are looming, the stress levels are high.

"It's the nature of the work. When we are doing something like preparing slides for a major presentation, we like to have enough lead time, but that doesn't always happen since other people are always working under their own deadlines."

It's not unusual, she said, for professors to zip into her office en route to the airport—"gripping their briefcases and biting their fingernails."

Although the staff has stayed late to get the job done, to date no professor has missed a flight. ▼

— Story by Melissa Mitchell,
courtesy of Inside Illinois

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► faculty updates

John R. Laughnan, 1919-1994

John R. Laughnan, 74, professor emeritus of plant biology and agronomy, died July 15.

He received his BS from the U. of Wisconsin in 1942 and his PhD from the U. of Missouri in 1946. He was a faculty member at Princeton U., 1947-49; UIUC, 1949-54; U. of Missouri, 1954-55; and returned to UIUC in 1955. At UIUC he held appointments in plant biology (botany), agronomy, and genetics and development. In botany he served as chairman, 1955-59, and head, 1963-66. Although he retired in 1990, he remained active in research.

He was deeply committed to undergraduate teaching and graduate training, and cherished his time in the field and laboratory engaged in research. In recognition of his scholarly excellence, he received the 1982 SOLS Distinguished Lecturer Award.

His early research included studies of genetic duplications in maize and *Drosophila*. In the early 1970s, he was part of a national effort to find a solution to Southern corn leaf blight. This work led to his research on the genetic basis of cytoplasmic male sterility and restoration of fertility in maize, which was continuing at the time of his death.

Early in his career he noticed that corn kernels that carried a mutant gene, *shrunkn 2*, were sweeter tasting than those of traditional strains of sweetcorn. He developed strains of maize, later released to commercial breeding companies, that led to the supersweet hybrids enjoyed today.

Prof. Laughnan will be remembered for his long hours of work in the lab



and field, careful planning of experiments, close observation and meticulous records of results, concern for friends and colleagues, integrity, and quiet good humor.

He is survived by his wife, Susan, 2 sons, a daughter and 12 grandchildren.

Memorial contributions may be made to UIF/John R. Laughnan Fund in Plant Biology, which will be used for plant biology graduate students to travel to scientific meetings. ▼

May Berenbaum, professor and head of Entomology, was one of 60 U.S. scientists elected this year to the National Academy of Science in recognition of distinguished research and continuing achievements.

UIUC received a \$3.0 million grant from the Markey Trust for molecular neuroscience. **Akira Chiba** and **Anne Craig** are the first Markey neurobiologists hired from this initiative. Dr. Chiba researches the function of cell adhesion and cell recognition proteins in establishing neuromuscular recognition. Dr. Craig analyzes the development, maintenance, and plasticity of central nervous system synapses at the molecular level. Both will be affiliated with Cell & Structural Biology.

William L. Daniel, associate professor of Cell & Structural Biology and the College of Medicine, was selected by the COM class of 1995 to receive the Raymond B. Allen instructorship award for distinguished teaching and representing "the highest professional ideals."

Chris Q. Doe, associate professor of Cell & Structural Biology, joins a select group of 43 other scientists as a

Howard Hughes Medical Institute investigator. His selection followed a national competition. He will continue his research into molecular mechanisms that enable neurons to function properly in the central nervous system.

Albert S. Feng, professor and head of Physiology & Biophysics, was named a fellow in the American Association for the Advancement of Science.

Alan F. (Rick) Horwitz, professor and head of Cell & Structural Biology, was appointed an associate in the Center for Advanced Study for 1994-1995. He will work on the cycle of events that produce directed cellular migration.

Benita S. Katzenellenbogen, professor of Physiology and Cell & Structural Biology, was selected as the 1994 faculty of the year by the College of Medicine. She was cited for her accomplishments in research and her commitment to the students and the College.

Paul C. Lauterbur, professor of Physiology & Biophysics and director of the Biomedical Resonance Laboratory, received the 1994 Kyoto Prize from Japan's Inamori Foundation. He was cited for his contributions to the development of the magnetic resonance imaging (MRI) scanner. He was also awarded the Dickson Prize for Science from the Carnegie-Mellon Foundation.

James Slauch, assistant professor of Microbiology, was named co-winner of the 1992-93 Newcomb Cleveland Prize by the American Association for the Advancement of Science. The annual prize honors the best research article written by new researchers and published in *Science*.

Carl R. Woese, professor of Microbiology, was awarded an honorary doctor of science degree from Syracuse University in May 1994. ▼

Emerson's Legacy (continued from page 1)

study of photosynthesis at UIUC. Faculty from plant biology, microbiology, biophysics, physics, physiology, and agronomy, are studying photosynthesis from global scales down to the molecular level (see figure). Their efforts have contributed many of the seminal observations that have led to modern views of photosynthetic processes—from the mechanism of primary events in picoseconds to factors limiting crop yields in the field—and to the development of many new techniques.

Another lasting legacy of that early photosynthesis unit is the value placed on training students. In the early 1950s, over 20 graduate students were involved in photosynthesis research.

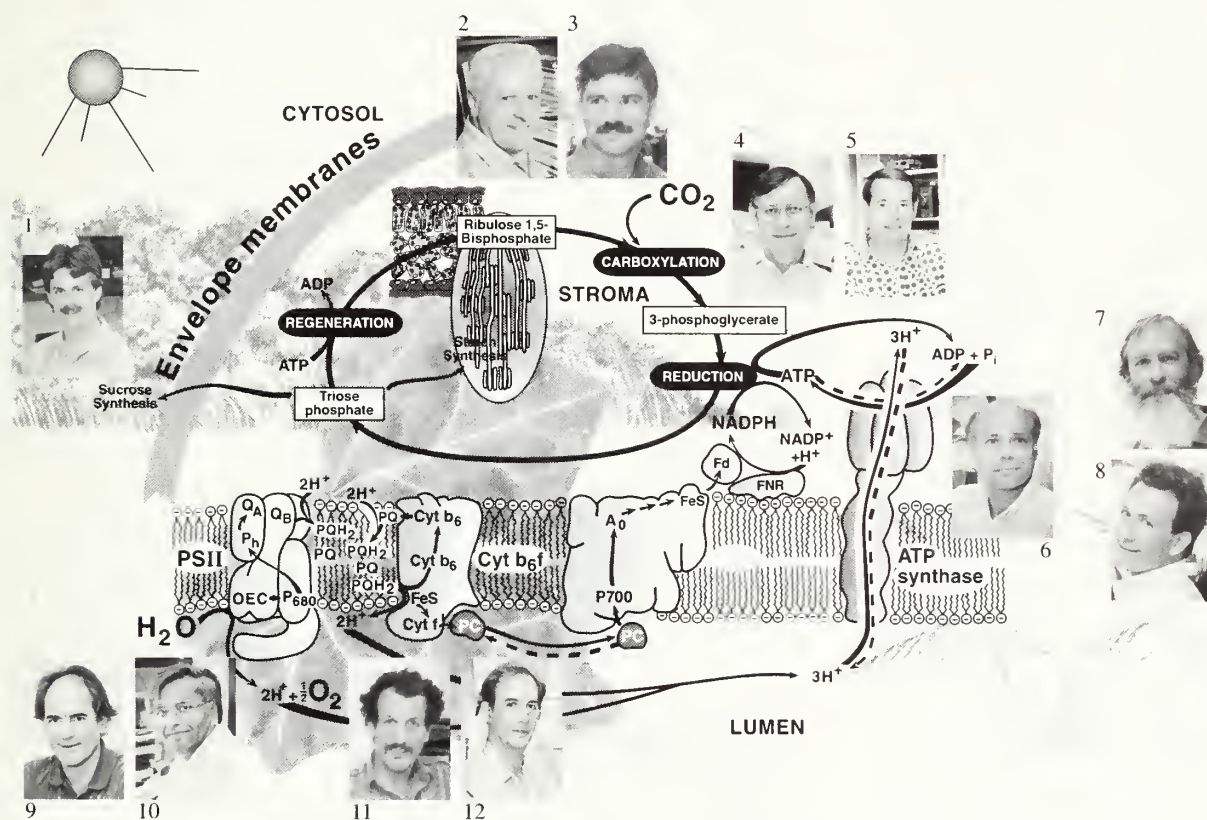
That training commitment has grown in the ensuing years. Students graduate from the program with the ability to consider, evaluate, and implement diverse technical approaches to the solution of specific problems. The program's excellence has been recognized through training grant awards by the McKnight Foundation and the U.S. Department of Energy.

Although Emerson's mortal life was cut short by a plane crash in 1959, Rabinowitch wrote, "Everyone who has come in contact with Bob must have been inspired by him to some degree... This is a kind of immortality—at least survival for another lifetime—in the memories and even to

some extent in the characters of other people, which it is given to very few men to achieve."

Each year SOLS presents the Robert Emerson Memorial Award to its outstanding graduate student, in recognition of research promise and excellence in research and teaching.

But the qualities of integrity, hard work, devotion to science, and respect for true scholarship so admired by Emerson need to be recognized—and fostered—at an early age. During the next SOLS Annual Fund Drive, you will have the opportunity to add to the Emerson Endowment to establish an annual undergraduate scholarship. We believe that Bob would be pleased. ▼



Primary UIUC researchers currently working on photosynthesis. (1) D.R. Bush, USDA, Plant Biology; (2) D.E. Buetow, Physiology, Plant Biology; (3) R.E. Zielinski, Plant Biology; (4) W.L. Ogren, USDA, Agronomy, and member of the National Academy of Science; (5) A.R. Portis, Jr., USDA, Agronomy; (6) D.R. Ort, Plant Biology, USDA; (7) J.M. Cheeseman, Plant Biology; (8) E.H. DeLucia, Plant Biology; (9) J. Whitmarsh, USDA, Plant Biology; (10) Govindjee, Biophysics, Plant Biology, and a student of Emerson; (11) C.A. Wraight, Biophysics, Plant Biology; and (12) A.R. Crofts, Biophysics, Microbiology. (Drawing modified by Joan Apperson, SOLS Artist Service.)

► alumni news

1930s...

Malcolm S. Ferguson (PhD Zoology '37), and his wife **Ruth**, were on campus Oct. 14 to present the first Harley J. Van Cleave Fellowship to Nida Gleveckas, a biology master's student. Their generous endowment will alternate between graduate student fellowships and research support for faculty or students in memory of long-time zoology Prof. Van Cleave. The Fergusons reside in Port Charlotte, FL, and he keeps active in environmental programs, Habitat for Humanity projects, and Scottish history and genealogy.

Geraldine (Moon) Nilsson (MS Botany '38) is a retired instructor of biology, Elmhurst College, Elmhurst, IL. She now lives in Mulberry Grove and is active in community service at the hospital and health department.

Mildred (Parizek) Zukor (BS '32, MS Zoology '37) says, "At 83, I'm still overseeing my 40-acre Wisconsin farm, a condo on the Wisconsin River, and my Westchester (IL) home." She retired in 1976 after 43 years of teaching, 30 years at Morton High School, Cicero, IL, and 13 years at Morton College.

1940s...

C. Leplie Kanatzar (MS '36, PhD Zoology '40) was professor of biology and department chair of MacMurray College for many years. He retired in 1974 as dean and in 1986 was awarded a D.Hum. by MacMurray College. He currently holds offices in the Wells Center (alcohol and drug recovery center), is active in the American Association of Retired Persons, and is involved in numerous volunteer activities.



Seeds of Revolution: Restoring Prairies

Like many Americans in the early 1930s, Theodore Sperry [MS '31, PhD Botany '33] was hunting for a job. He found it supervising a crew for the Civilian Conservation Corps. Little did Sperry know that he was planting the seeds to a revolution of sorts—literally.

In 60 acres of Wisconsin cornfield and bluegrass pasture, Sperry, fresh out of college, began rebuilding a tallgrass prairie. It was the first experiment of its kind anywhere in the world.

"He was a pioneer in the truest sense of the word," said Greg Armstrong, director of the University of Wisconsin Arboretum, Madison, which manages that prairie today. Today there is a growing interest in the prairies that can be traced in a straight line back to the work Sperry began in the 1930s.

For many in the 1930s, prairie was nothing more than blank spaces that separated forests—something to be grazed over rather than gazed at. "Plow it and plant it. That's all people thought the prairie was good for," says Sperry.

Officials at the University of Wisconsin were planning an arboretum with hopes of duplicating the forest communities of Wisconsin. They enlisted the aid of Aldo Leopold, the [famous] conservationist. Because part of Wisconsin was once covered with tallgrass, he suggested recreating a patch of tallgrass prairie for their arboretum.

"They didn't have anybody in Wisconsin who knew anything about prairies," noted Sperry. He had written his doctoral thesis on prairie roots, and when Leopold saw it he contacted Sperry, gave him a shovel, a crew, and put him in charge. [A prairie restoration] "was Leopold's inspiration and my perspiration."

Sperry found many of the seeds he needed along railroad tracks. Old cemeteries were another rich vein for seed. A road going through a nearby prairie allowed him not only to collect plants and seeds, but sod as well. The sod contained many of the fungi, bacteria, and other organisms needed to rebuild the foundation of the prairie—the soil.

Sperry supervised the site from 1936 to 1941, when the war called him for other duties. In 1982, he returned for a survey of the same 60 acres with his original field notes. They located each of more than 230 plantings, and marked what happened to them after nearly half a century.

To this day, no one is sure how long it takes to restore a prairie. "We are puzzled now as to when a prairie reaches maturity," Sperry says. "Biology doesn't [stand] still. It's still history in the making."

— Condensed from an article by Andy Ostmeyer, *The Joplin [MO] Globe*, Nov. 1, 1993

Editor's Note: Sperry is professor emeritus of biology, Pittsburg State University, Pittsburg, KS. He is still contributing manuscripts on the development of the Curtis Prairie.

1950s...

Edmund M. Bernhauer (MS '59, PhD Physiology/Physical Education '59), professor emeritus at the University of California, Davis, is teaching part time. He still serves as an advisor in the graduate programs and is active in three research areas: NASA's man in space program, maintenance of physiological function in space; the National Institute of Disability and Rehabilitation Research, neuromuscular disease; and NIH's role of exercise in the management of hypertension.

Robert B. Chiasson, PhD, (MS Zoology '50) retired in 1992 as professor in zoology, biological sciences, veterinary science, and anatomy, University of Arizona, but continues to serve on university committees and is revising dissection guides for Wm. C. Brown Co.

George B. Craig, Jr. (MS '52, PhD Entomology '56) is the Clark Professor of biology, University of Notre Dame, Notre Dame, IN. In 39 years of grant support from NIH on *Aedes* mosquitoes, he has produced 40 PhDs and 450 publications. In 1992 he received the Hulman Medal from the Indiana Public Health Association and in 1993 the Walter Reed Medal from the American Society for Tropical Medicine & Hygiene.

Wayne H. Davis (MS '55, PhD Zoology '57) is a professor of biological sciences, University of Kentucky, Lexington. He was named 1993 naturalist of the year by the Kentucky Society of Natural History.

Mary E. (Mangaoang) Harris (BS '56, MS Biology '57) is a retired biology and general science teacher who is now self-employed with housecleaning services, art sales, lectures, and tours. She is also involved in volunteer activities in both Mariposa and San

Francisco, CA, including church, community chorus, Yosemite Area Audubon Society, Mariposa Historical Society, Laguna Honda Hospital, and the San Francisco Food Bank.

Louis Hildebrand, MBA, (BS '49, MS Zoology '50) is a vice-president of Smith Barney Shearson in New York. He is involved in portfolio management and retail sales of securities.

Robert Vix Kennedy (BS '55, MS Zoology '58) is president of R. Vix Kennedy, Inc., Brighton, MI. He designed "Garden for the Senses" and is involved with landscape design including water effects. He grows over 300 cultivars of herbaceous perennials for retail sale. In 1992 he was named outstanding retail grower of the year for Michigan in the areas of per square foot, quality, and herbaceous perennials.

William C. Marquardt (MS '50, PhD Zoology '54) is professor emeritus of zoology at Colorado State University. "Since my retirement, I have been engaged in coordinating and teaching a 2-week summer course on the biology of disease vectors, revising my parasitology textbook, and co-editing a textbook on disease vectors. I have also written a small book entitled *How to Get a Job in Academia*. There seems to be little time for what is traditionally called retirement."

Norman D. Martin (PhD Ecology '56) is director of Commonwealth Laboratory, Belleville, Ontario, where he is involved in a long-term research program on the biotic forest communities of Ontario.

Grover Jackson Norwood (MST Biology '50) is retired from teaching senior high school science. He says that he has "...fond memories of his years at UIUC in the era of Drs. Balduf, Van Cleave, and Jones."

Victor J. Wilson (PhD Physiology '53) is a professor at Rockefeller University, New York, NY. His research involves the central nervous system and is managing editor for *Experimental Brain Research*.

1960s...

Ruth (Karlin) Guth, MD, (BS Zoology '65) is in private ob/gyn practice in Highland Park, IL, and is chief of obstetrics & gynecology at Highland Park Hospital.

Margaret S. (Darrow) Henley (BS Microbiology '66) is a senior technician/group leader at Oxford Superconducting Technology, Carteret, NJ, doing plating chemistry research. "My training from UIUC, though I never worked in my major, has stood me in good stead during an eclectic life..."

Larry J. Howell, MBA, (BS Zoology '68) is vice-president of finance for the Energy Group of Black & Veatch, Kansas City, MO.



Roar Leif Irgens (PhD Microbiology '63) retired in 1991 from the biology department, Southeast Missouri State University,

Springfield, after 25 years of teaching. He received the 1991 Carski Foundation distinguished teaching award as "a master teacher of microbiology and of life" and the 1991 Burlington Northern Foundation faculty achievement award for teaching excellence. He stays busy "gardening, biking, listening and playing music, tracing genealogy, rug hooking, etc., etc."

Charles J. Klein (BS Zoology '64) is manager of regulatory affairs/compliance of Computed Anatomy, Inc., New

York City. "My degree in zoology has served me well, although I never worked in the field. My training proved to be excellent preparation for working in FDA-controlled businesses, and in the quality assurance/quality control area. Naturally, interest in the animal world never dies, and neither do the rewards of having studied under wonderful instructors like Charles Kendeigh and Hobart Smith."

Lance G. Peterson (PhD Entomology '68) is a development specialist for DowElanco, Tallahassee, FL. He is involved in developing agricultural pest management systems to control insects, diseases, and nematodes in crops. Although his immediate area of geographical responsibility is the southeastern U.S., he is ultimately concerned with agriculture worldwide.

Gust Rouhas (BS Microbiology '69) is director of quality assurance, Marriott International, Los Alamitos, CA.

Jack W. Shouba (MS Biology '64) is a science teacher at Lyons Township High School, Western Springs, IL. He co-founded Save the Prairie Society, which shared the National Park Services' Land & Water Conservation Fund Excellence Award for 1993.

William Q. Wiehrdt (BS Zoology '68) is assistant regional administrator for the Occupational Safety & Health Administration, U.S. Department of Labor, Chicago. He is responsible for providing current standards interpretations, engineering analysis, expert witness, and technical information dissemination to field staff in OSHA's largest region. "...I am vicariously reliving my undergraduate days at UIUC through my oldest son, Jason, who is currently a student [there]. My daughter will be entering college next year with the intention of being accepted in the College of Veterinary Medicine. And my youngest son wants to play rock and roll."

Jerrold H. Zar (MS '64, PhD Zoology '67) is professor of biological sciences, associate provost for graduate studies & research, and dean of the graduate school, Northern Illinois University, DeKalb.

1970s...

John T. Allin (PhD Zoology '70) is an aquatic ecologist for the Ontario Ministry of Natural Resources, Peterborough. He is involved with policy and program development to protect aquatic habitat from potentially harmful effects of development. He appeared recently as an expert witness on the environmental effects of timber management at public hearings under the Ontario Environmental Assessment Act.

Richard P. Arsenty, MLS, (BS '67, MST Biology '70) is science librarian for the State University of New York at Purchase involved with science references, bibliographic instruction, collection development, and computer applications in reference.

John C. Bruner, MS, (BS Zoology '72) is working on a PhD in zoology at the University of Alberta, Edmonton. His thesis is "*A phylogenetic analysis using cladistics of Percidae based on osteology, meristics, and morphometrics.*"

Robert Wayne Clegern (MS '66, PhD Entomology '72) retired from active duty in the Air Force in September 1993. He is serving as research liaison officer for the Department of Defense, Gainesville, FL. He sent along a newspaper clipping about his rather unusual collection—500+ sheets of international toilet paper. "Toilet paper is cheap, easy to pack, and it's an interesting conversation piece."



R. Stephen Corn, PhD, (BS Biology '74) is a zoologist for the National Biological Survey, Ft. Collins, CO. He is researching threatened and endangered amphibians and reptiles, and is the editor for *Northwestern Naturalist* and *Herpetological Conservation*.

John F. Davis, DDS, (BS Microbiology '72) is a dentist and member of the Park Ridge Healthy Community Partnership, Park Ridge, IL. He is also a teaching assistant at the L.D. Pankey Institute for Advanced Dental Education in Key Biscayne, FL.

Julie (Szczepanski) Deisinger (BS Microbiology '75) is a doctoral student in clinical psychology at the Illinois Institute of Technology, Chicago. As part of her current training, she does psychological assessment on the medical rehabilitation and spinal cord injury wards at Hines VA Hospital.

Michael R. Ebert (BS Microbiology '74) is president of Machinery & Equipment Co., Inc., San Francisco, CA.

Catherine A. Fitzgerald, MBA, (BS Biology '74) is vice-president of sales, Pyramid Technology, San Jose, CA.

Carol B. (Burkhart) Fox, MS, (BS Biology '76) is an associate scientist in the Pfizer Central Research Neuroscience Department, Groton, CT.

Edwin M. Goebel, PhD, (MS Microbiology '75) is a microbiologist and assistant to the principal at the Illinois Mathematics & Science Academy, Aurora.

Jorge Guerrero, DVM, (MS '69, PhD Zoology '71) is managing director of the agrochemical/veterinary division of Merck & Co., Inc. in Madrid, Spain. He was named universal veterinary of the year in 1992 and received the Chairman's Award, Merck & Co., Inc., in 1993.

Gone Fishing

"Gone fishing" could be a permanent, and appropriate, sign attached to the office door of University of Wisconsin-Oshkosh biology professor Walter Rainboth, PhD, (BS '71, MS Genetics & Development '73). While he might not bring back a stringer hanging heavy with fish, he has brought back a notebook and library full of fish facts and figures.

For the past 20 years, Rainboth has immersed himself in ichthyological studies in every major water body from Laos to Thailand, Vietnam, Bangladesh, and French Guinea.

His involvement in fisheries work was almost accidental, since he had gone to the University of Michigan to study biology. Upon arrival, he heard about a professor who was working on fisheries projects in Southeast Asia. In talking with other students, Rainboth quickly learned there were a number of people on campus who were to be involved in a Southeast Asia tour.

"I went over and talked to him, and within a month, I had my things packed up and was overseas," says Rainboth. "I thought it was a great idea to be able to study biology and have your way paid to go to the Tropics."

His first time in Southeast Asia, Rainboth spent two years as a committee member of a U.N. group. He ended up going overseas to the Tropics several more times to do fish sampling surveys.

"In a way, those trips have really determined how my career has gone because I got so interested in it that I spent all of my time doing that," he said. He has also done consulting work for National Geographic Society, California Academy of Sciences, the Museum of Comparative Zoology at Cambridge, and others.

"It was a fascinating experience, not just in terms of the biology, but also in learning about the culture."

He plans to spend a lot of time at Oshkosh. "Right now, I have enough information and data to write papers for a long time to come...it's just a lifetime's worth of work."

— Condensed from an article by Jim Flasch,
The Post-Crescent, Oct. 3, 1992

Jon M. Haas (BS Biology '75) became commanding officer of the Navy's Helicopter Mine Countermeasures Squadron 18, Norfolk, VA, in January 1994.

Claudette H. Harar (BS Biology '76) is a complaint analyst for Abbott Laboratories, Abbott Park, IL. She is also a member of the Board of Directors, Orchard Village, Skokie, and is a member of the Women's Auxiliary of Orchard Village.

Deb Harper, MD, (BS Microbiology '76) is a pediatrician at Valley Young People's Clinic, Spokane, WA. She also works with the Regional Center for Child Abuse & Neglect and is on the board of Spokane Child Abuse & Neglect.

Kay G. Holt, MD, (BS Biology '70) is in private practice in child and adolescent psychiatry in Orlando, FL.



Stephen J. Jepsen, MD (BS Microbiology '77) is a vascular surgeon at the Ohio Heart & Thoracic Surgery Center, Columbus, and staff surgeon at Riverside Hospital and Mount Carmel Medical Center.

Irene M. Jones (PhD Biology '72) is a senior staff scientist and associate director of the Biology & Technology Research Program, Lawrence Livermore National Laboratory, Livermore, CA. She is researching the genetic consequences of exposure to radiation in people, mechanisms of mutation, and interindividual susceptibility to disease.

Corinne E. (Frank) Kohler, MD, (BS Microbiology '75) is a first-year resident in family practice at Carle Foundation Hospital, Urbana.

Carla (Miller) Klopfenstein (BS Microbiology '70) is a professional sales representative for Smith Kline Beecham Pharmaceuticals, Philadelphia, PA. She resides in Morton, IL, and is a trustee of the Morton Public Library and a precinct committeeman.

Barbara E. Larrain (BS Microbiology '74) is working part-time for Boise Cascade, Portland, OR, doing environmental testing of dioxins in mill effluent, pulps, and slug and also for OHSU looking at autoimmune changes in mice. She is a very active outdoors enthusiast. "This summer I was fourth in my age group in the Ironman competition." She has been competing in triathlons since 1985.



Shirley (Yaw) Lynn (MS Microbiology '70) is a development group leader for Eastman Kodak, Rochester, NY. She is developing rapid diagnostic kits and holds several patents in the clinical diagnostic field.

Jeffrey T. Mack (BS Biology '74) is a fourth-year student at the University of Nevada School of Medicine, Reno. He plans to do a residency in emergency medicine.

Douglas J. Mandel (BS '73, MS Biology '75) is an information biological scientist at Abbott Laboratories, Abbott Park, IL. He is also concert-master and lead clarinet for the Northbrook Pops Orchestra.



William K. Medler (MS Entomology '74) is in his 20th year of teaching at Hoopeston Area Community Unit

School District 11. He is active in the Local Education Association and recently contracted and built a home.

Michael T. Merrion (BS Biology '71) is a medical sales representative for Procter & Gamble Pharmaceuticals. He resides in Roswell, GA, and is a Captain in the Civil Air Patrol.

Michael M. Moon, MD, (BS Microbiology '70) is a staff pathologist at Crittenton Hospital, Rochester Hills, MI. And **Nancy L. (Effland) Moon, MBA**, (BS Microbiology '71) is president of IQ Solutions, Franklin, MI.

Susan L. Nagele (BS Biology '78) is a medical officer for the Catholic Diocese of Torit, southern Sudan, where she is providing primary health care to the Sudanese displaced by the war.

Morry A. Olenick, MD, (BS Biology '79) specializes in hand surgery in his private and academic practice in Denver, CO.

Stephen R. Ortman (BS Biology '74) is a senior buyer for Motorola, Inc., Itasca, IL. His team was second place runner-up in his division of

Motorola's total customer satisfaction competition worldwide in 1992. He has been a volunteer at the Spring Valley Nature Sanctuary, Schaumburg, for over 5 years, working on many conservation and restoration projects.

Leslie V. (Dargo) Parise, PhD, (BS Biology Honors/Chemistry '76) is an associate professor in pharmacology, University of North Carolina, Chapel Hill, where she directs laboratory research and teaches graduate and medical students.

Hal S. Pineless, MD, (BS Zoology '76) is a neurologist in Winter Park, FL. He recently ended a 3-year term as chief of staff at Florida Hospital-East Orlando and was named physician of the year by that hospital in both 1988 and 1992.

Carlos F.A. Pinkham (PhD Biology '71) is an adjunct professor of biology at Norwich University, Northfield, VT, researching the behavior of the Pinkham-Pearson index under different sampling conditions. He is also a consultant to TerraCopia, which makes the "Wall o' Water" plant protector, which he co-invented.

Thomas N. Porter, MD, (BS Zoology '76) is a urologist in private practice in Libertyville, IL.

Holly A. Rosencranz, MD, (BS Microbiology '78) is an internist at St. Francis Center for Women's Health, Evanston, IL.

Scott A. Shapiro, MD, (BS Biology '77) is associate professor of neurosurgery and assistant director of the neurosurgery residency program, Indiana University Medical Center, Indianapolis. He serves as chief of neurosurgery at Wishard Hospital.



Pamala (Mason) Silvers (BS Biology '76) is manager of a free standing ambulatory surgery center in Spokane, WA.

Keith R. Solomon (PhD Entomology '73) is director of the Centre for Toxicology, University of Guelph, Guelph, Ontario, where he is involved with research and teaching in the environmental toxicology of pesticides.

Ardythe (Albers) Sommerville (MST Biology '70) is a life science teacher at Jonathan Turner Junior High School, Jacksonville, IL. She raises and shows quality Tennessee walking horses.

Robert G. Striegl, PhD, (MS Biology '76) is a research project leader for the National Research Program, U.S. Geological Survey. He is studying carbon dioxide and methane exchange across soil-atmosphere and water-atmosphere interfaces and carbon cycling processes in soils and lakes, with an emphasis on greenhouse gases and uptake in the context of global change. He is currently involved with NASA's boreal ecosystem atmosphere study in Canada and in the study of desert soil respiration and desert trace-gas exchange.

Glen Michael Swindle, MD, (BS Biology '78) is staff physician in emergency medicine for Carle Clinic Association, Champaign. He coordinates medical student and resident training activities during their emergency medicine rotation at Carle.

Jon Thiessen (BS Microbiology '72) is a medical technologist/toxicologist at St. Joseph Hospital, Tacoma, WA.

Marjory (Stafford) Tunnell (MS Botany '70) is a seventh grade science teacher at Gregory Middle School, Naperville, IL. She was named the South Carolina biology teacher of the

year in 1985 and the most influential teacher, Gregory Middle School, for 1989-1992.

1980s...

Margaret (Pollowy) Adrian (BS Microbiology '85) resigned from her position as medical and diagnostic membrane marketing manager for Gelman Sciences after the birth of her second son. She is currently working as a freelance technical marketing consultant for Gelman out of her home in Ypsilanti, MI.

William M. Baader, MD, (BS Biology Honors '81) is a plastic surgeon in Bellingham, WA.



Donna M. Balash (BS Ecology, Ethology & Evolution '89) is a graduate student in biopolitics at Northern Illinois University, DeKalb. She completed her master's degree in December and expects to complete her PhD in August 1995.

Nancy J. Bender, MD, (BS Biology Honors '88) is a resident physician in neurology, University of Iowa Hospital & Clinics, Iowa City.

Carol E. (Murphy) Bernson, MS, (BS Biology '82) is assistant director of operations, UIUC Campus Honors Program.

Joyce (Wong) Blanding, PhD, (BS Bioengineering '86) is a postdoctoral fellow at the University of Virginia studying the electrophysiology of renin-containing cells.

Kendra N. (Schmidt) Brockamp (BS BioLogy '89) is an environmental protection specialist/project manager for the Illinois Environmental Protection Agency, Bureau of Land, Springfield. She was co-winner of a \$20,000

award from USEPA to be used for a streamlining project. She and husband Dale are active in Big Brother/Big Sister of Sangamon County.

Tamara A. (Hrynko) Camp (BS Biology '89) is laboratory supervisor for the DNA & Immunogenetics Institute, Chicago, where they conduct paternity and forensics analyses.

Thomas P. Carroll (MS Plant Biology '86) is biology teacher at a private school in Washington, DC. "I have been teaching high school biology for 8 years and I have loved every second of it!"

Lannie James Cation, MD, (BS Biology '87) is chief medical resident and staff internist at the USAF Medical Center, Wright-Patterson Air Force Base, OH.

Cynthia (Nau) Cornelissen (BS '84, MS '86, PhD Microbiology '89) is a research associate in medicine, University of North Carolina, Chapel Hill.

Leonard P. Dintenfass, PhD, (BS Entomology '80) is a senior research biologist for DowElanco, Geneseo, IL. He is responsible for conducting agricultural field research and testing the efficacy of experimental plant protection compounds and other strategies for insect pest management.

Martin S. Dubravec, MD, (BS Biology '88) is a resident in internal medicine at Fitzsimons Army Medical Center, Aurora, CO.

Vincent A. Dubravec, MD, (BS Biology '85) is a fellow in allergy/immunology at Fitzsimons Army Medical Center, Aurora, CO. Among his current interests he lists "playing jazz piano, skiing, wind surfing, hiking, and travelling abroad."

Tina (Coleman) Fess (BS Biology '86) is a zoo attendant/animal caretaker at Seneca Park Zoo, Rochester, NY.

Benjamin A. Hasan, MD, (BS Physiology '83) is a sports medicine fellow in family practice, MacNeal Hospital, Berwyn, IL. He is writing clinical reviews on sports medicine for team physicians.

Kimberly A. Hogan (BS Biology '88) is pursuing an MD at the Medical College of Wisconsin and plans to go into family practice.

Samuel F. Hohmann (PhD Bioengineering '80) is director of Healthcare Information Services for MMI Risk Management Resources, Deer Field, IL. His unit conducts research related to medical liability, financial risk, and outcomes.

Jane (McWard) Hunter (BS '85, MS Biology '86) is the girls' tennis coach at Noblesville High School, Noblesville, IN, and also the tennis coordinator for Hamilton Co. YMCA.

John W. Jones (BS Ecology, Ethology & Evolution '87) is a wildlife biologist for Shadow Creek Golf Course/Mirage Resorts, Inc., Las Vegas, NV. He oversees the health and well being of wildlife on the golf course, ranging from wallabies to African cranes to mandarin ducks. He is also involved in a breeding program and educates the public and school children about the importance of the survival of wild animals.

Mamoru Kondo (MS Biophysics '84) is a marketing engineer for Rigaku Corporation, Akishima, Japan.

Benjamin D. Krumstok, MD, (BS Biology '89) is a resident in diagnostic radiology at Michigan State University-Grand Rapids Area Medical Education Center.

Debra A. Levinthal, DPM, (BS Biology '87) graduated cum laude from Scholl College of Podiatric Medicine in 1991 and was a surgical fellow at Mercy Hospital in Des Moines, IA. She opened an office in Hoffman Estates, IL, in July 1994 and is an attending physician at Cook County Hospital, Chicago.

Richard L. Lindroth (PhD Biology '84) is an associate professor at the University of Wisconsin, Madison. His research studies chemical ecology and global change.

Marcos A. López, MD, (BS Biology '88) is an ophthalmology resident physician at Interfaith Medical Center, Brooklyn, NY.

Jack D. Lyons, MD, (BS Biology '87) is currently a diagnostic radiology resident at Rush-Presbyterian-St. Luke's Medical Center, Chicago.

Lori (Petersen) Mitchell (BS Biology '88) is a software engineer for Computer Science Raytheon, PAFB, FL.

Timothy J. Moran, MD, (BS Biology '85) is an emergency medicine physician at St. Mary's Hospital, Kankakee, IL.

Howard Benjamin Oller (BS Ecology, Ethology & Evolution '89) is a biologist and project manager for the U.S. Army Corps of Engineers, Chicago.

Kimberly (Hogue) Pollitt (BS Biology '89, MBA '90) is an investment analyst for the Illinois Teachers' Retirement System, Springfield. She became a chartered financial analyst in 1993.

Marc B. Rogers (BS Microbiology '88) completed his PhD in microbiology at East Carolina University in December 1993. His research has been

on the anaerobic bacterium *Bacteroides fragilis* and antibiotic resistance. He started a postdoctoral position at Massachusetts General Hospital in March.

Derin S. Rominger, MD, (BS Biology '85) is an ob/gyn physician at Decatur Memorial Hospital and St. Mary's Hospital in Decatur, IL. He opened his practice in August 1993.

Walter F. Ronney, Maj., DMD, (BS Biology '83) is a dentist in the U.S. Army, currently stationed at Ft. Meade, MD.

Toby R. Sadkin, MD, (BS Genetics & Development '84) is a physician in family practice at St. Albans, VT.

Gay Ann (Caspary) Schulte, MT, (BS Biology '83) is a medical technologist for the blood bank of Methodist Medical Center of Illinois, Peoria.

Elizabeth A. Shaughnessy, MD, PhD, (BS Biology Honors '81) is a clinical and research fellow in oncologic surgery, City of Hope National Medical Center, Duarte, CA. She is working on the development and *in vitro* and *in vivo* evaluations of adeno-associated viral constructs for use in clinical trials of gene therapy. She received the Schiff award for compassionate patient care in the department of surgery in 1993.

Vincent T. Versaci, DDS, (BS Biology '83) is a dentist in Western Springs, IL.

Deborah A. (Neher) Weicht, PhD, (MS Plant Biology '86) is a visiting assistant professor at North Carolina State University, Raleigh.

She teaches a graduate course in introductory plant disease epidemiology

and is developing a nematode community indicator to measure soil ecological health. She was recently awarded a competitive, 2-year, \$288,000 grant from USEPA for her research program.

Courtland E. Yockey (BS Microbiology '86, MS Biochemistry '91) is a research associate in molecular medicine, Beth Israel Hospital, Boston, MA. He is involved in cloning and characterizing novel muscle-specific transcription factors.

1990s...

Melissa M. Alexander (BS Biology '91) is a graduate research assistant in the UIUC's College of Veterinary Medicine.

Lara G. Borgerson (BS Biology '90) completed her DVM degree at UIUC in May 1994. In September 1993 she was awarded the Veterinary Centers of America scholarship for proficiency in small animal medicine.

Anita M. Brinker (PhD Plant Biology '90) is a postdoctoral fellow, Alexander von Humboldt Foundation, Institut für Pharmazeutische Biologie und Phytochemie, Münster, Germany.

Arthur C. Cheng (BS Cell & Structural Biology '93) is a first-year medical student at Chicago Medical School, where he is involved with CARES, which teaches local junior high students about AIDS, and the family medicine interest group.

Mary Frances (Newman) Gile (BS Biology '91, MST '93) is a science teacher at Edison Junior High School, Pekin, IL.

Jeanne (Hsieh) Gin (BS Biology '90) is a master's degree student at George Washington University, Washington, DC, in community counseling.



William P. Hanafin (MS Biology '90) is a research specialist in veterinary pathobiology at UIUC's College of Veterinary Medicine, where he is involved with identifying and characterizing a receptor for porcine rotavirus.

Irene T. Hernaez (BS Biology '92) is a second-year student at Scholl College of Podiatric Medicine, Chicago. She is the 1996 class secretary and is active in Alpha Gamma Kappa, the Sports Medicine Association, and the Surgery Club.

Richard Htwe, MBA, (BS Bioengineering '90) is an applications engineer for Phoenix Refrigeration Systems, Conyers, GA, where he designs commercial and industrial refrigeration systems.

Tina M. (Skowronski) Knox (BS Biology '92) is a research specialist and non-degree student in microbiology, UIUC.

Deborah K. (Smith) Mason (BS Biology '89) completed her MS degree in physical therapy in 1991 and is a physical therapist for the Norman Physicians Group, Norman, OK, where she works in orthopedics and sports medicine injuries. She competed in the 1992 Olympic Track & Field Trials in the women's shotput.

Christy K. Moeller (BS Biology '90) earned a BS in nursing from St. Louis University in 1991. She is a staff nurse in the neonatal intensive care unit at St. Louis Children's Hospital, St. Louis, MO.

Whitney A. Neufeld-Kaiser (BS Biology '92) is a second-year graduate student in genetics, University of Washington, Seattle. She is studying transcription elements of the human malarial parasite *Plasmodium falciparum*. She was recently awarded a Howard Hughes Medical Institute predoctoral fellowship in biological sciences.

Matthew Elliott O'Neal (BS Biology Honors '92) is a Peace Corps volunteer in Ghana, West Africa, where he teaches biology, chemistry, and math at the Zebilla Secondary Technical School. He also coached the school's first ever football team. He is facilitating beekeeping training work-shops for forestry Peace Corps volunteers and their Ghanan counterparts, along with assisting local women's groups in small-scale apiary developments.

Diane R. Phelps, MT, (BS Microbiology '92) is a medical technologist at St. David's Health Care System, Austin, TX.

Lori A. Rinckel (MS '88, PhD Microbiology '92) is a postdoctoral fellow in the basic research program, National Cancer Institute, Rederick, MD. She is busy rehabbing her "new" old house, working with the Girl Scouts, and hiking the Appalachian trail.

▶ let us hear from you

Please send b/w photographs, news releases, or other information that can be included in subsequent editions.

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David T. Rubin (BS Biology Honors '90) is completing his MD at University of Chicago Pritzker School of Medicine. He plans to do his residency in internal medicine, possibly specializing in gastroenterology.



Lettie E. Schmitt (BS Biology '92) is QA/QC officer for Environmental Science & Engineering, Inc., Peoria, IL. In 1993, she was elected Secretary of the Peoria Section of the American Chemical Society and Chair of the Membership Committee. In 1994 she served as Chair-Elect of the Peoria Section of ACS.

Robin B. Septon (BS Biology '93) is a medical student at Rush Medical College, Chicago.

Melinda E. Snep (BS Microbiology '92) is a graduate student in molecular biology at Loyola University, Chicago.

Jay C. Vary (BS Biology '93) is a research technologist at Children's Hospital in Seattle, WA. He is working in a gastroenterology lab conducting research on *E coli* O157:H7. ▼

Daniel E. Welsh, 24, died Sept. 24, 1992, in Chicago, IL. He graduated from UIUC in biology in 1989. He was a senior medical student at Rush Medical College, where he was a member of Alpha Omega Alpha honorary society. ▼

► in memoriam

Joseph J. DeLucia, 72, died Sept. 9, 1993, at Duluth, MN. He earned his master's and PhD degrees from UIUC. He was a clinical psychologist prior to joining the staff at the University of Wisconsin-Superior.

School of Life Sciences Alumni Newsletter is published annually by the School of Life Sciences, University of Illinois at Urbana-Champaign. Comments and suggestions are welcome and should be addressed to:

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Illinois LIFE SCIENCES

at Urbana-Champaign

winter 1995

.....alumni newsletter

SOLS on the World Wide Web

by Barbara Meyer, Nancy Hyland, Jeffrey Haas, and Roy Roper
Office of Networked Information Technologies

Are you one of the millions that are regularly "surfing the 'Net?" Or are you still unsure of just what the Information Superhighway is? Initially, the "Internet," which provides access to a vast array of information resources worldwide, required individuals to learn at least a half-dozen utility programs. Thus, access to its resources was largely limited to those with both time and computer skills.

Development of the Mosaic browser by the National Center for Supercomputing Applications (NCSA) allowed the Internet to be reconceptualized as a "World Wide Web." Resources could be located, visited, and captured for future visits with a single mouse click.

As a result of those efforts, the Internet has evolved into a rich tapestry of color, motion, and sound. The World Wide Web, with its ease of use, its magazine-like pages, and its ability to allow the user to navigate transparently and effortlessly around the globe, is making an enormous impact on education.

The School of Life Sciences is actively involved in using this exciting new technology in teaching, administration, and research. For example, point your web browser to the emerging information gateway



Photo by Jim Corley, B & W Photo

From left to right, David Lampe, Entomology, Kathy Beutow, Molecular & Integrative Physiology, and Jeff Haas, Office of Networked Information Technologies, working on SOLS home pages on the World Wide Web.

to the School: <http://www.life.uiuc.edu/>. From this page, you will find a variety of resources, including departmental and faculty information, research databases, and course information ranging from lectures to interactive homework.

One major impact these interlaced technologies has had on Life Sciences is in computer-mediated education. In the past, individuals wishing to use computers for education had to learn basic and even

advanced programming and were often restricted in how the information could be played back and how students could interact with the materials.

Now, with the HyperText Markup Language as the basis of WWW programming, individuals only need to learn minimal programming skills to have a successful experience. Educators have found the Web an attractive structure for authoring and presenting course materials.

(continued on page 7)

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Director's Perspective...Signs of Change

When you next visit campus you may notice the departure of an old friend from the UIUC landscape. When I came in 1978, Treno's already had a 15-year tradition as a campus landmark on the corner of Goodwin and California. In those years, Treno's rambling rooms were a popular gathering place for an eclectic mixture of students and faculty. Known for its erratic service, lively atmosphere, and singular decor, Treno's was often among the highlights of the standard campus tour. But, as times changed, Treno's place in campus life faded. About 8 years ago the owners subdivided the building leaving Treno's only a quarter of its original size, and last year, after 31 years, the name disappeared from the building altogether.

The lithograph of Treno's reproduced here hangs in my kitchen and perhaps speaks to a bit of nostalgia that some of you may share with me. Nevertheless, the conspicuous popularity of the espresso and sandwich shops that now stand in Treno's footprint suggest that this was a change whose time had come.

If it has been a few years since you have visited campus, you may find yourself overwhelmed by the number of changes to what were

once familiar surroundings. In the last decade, the physical face of campus has changed dramatically as we have enjoyed an unprecedented era of new construction. Life sciences has enjoyed new facilities with the opening of the Beckman Institute on University Avenue in 1989, the E.R. Madigan Laboratory built literally in the middle of Goodwin Avenue in 1991, and now under construction, the Chemical & Life Sciences Laboratory situated just south of Morrill Hall. Sitting on the former site of Nature's Table



and the Horizon Bookstore, this massive new building is scheduled for completion in May and will add over 58,000 square feet of much needed research space to life sciences. Nearly the same amount of laboratory space will be available to chemical sciences in a separate wing. Approximately 20 faculty research laboratories from the departments of Microbiology and Cell & Structural Biology will be housed in this new facility.

While physical changes to campus have been profound, the most significant and far reaching changes at the University are not evident

just driving down the street. About the same time that Edward Bloom opened Treno's doors for business, the School of Life Sciences was created by coalescing the departments of Bacteriology, Botany, Entomology, Physiology, and Zoology, thereby creating for the first time a unified voice for biology in the College of Liberal Arts & Sciences. In the subsequent years, SOLS has evolved and undergone many changes. In those 36 years, more than 16,200 B.S. degrees have been granted, 2,100 graduate degrees earned, and 150 new faculty hired. The national and international reputation of the University of Illinois for research and education in the life sciences has flourished under the stewardship of SOLS.

Nevertheless, while SOLS and its departments have conscientiously tailored and refined their focus to meet the dynamic needs of students and faculty, these refinements are dwarfed by fundamental changes in the discipline of biology itself. The revolution in cellular and molecular biology over the past two decades has significantly changed not only the scientific face but also the societal impact of biological research and training. From this perspective, it is perhaps not surprising that, over the last decade, we have increasingly found our administrative and organizational structures to be obstacles to efficiently meeting our instructional and research goals.

In the last 5 years there has been an explosion in undergraduate enrollment in the life sciences at UIUC.

(continued on page 11)

How Birds Learn Songs May Shed Light on Brain Process

by Jim Barlow

A gene that contributes to Alzheimer's disease also may guide song-learning in birds, according to research conducted by David Clayton, assistant professor of Cell & Structural Biology. The gene contains the instructions to make a protein called synelfin that is linked with devastating brain lesions, known as senile plaques, a signature of Alzheimer's.

The research, which is described in the August 1995 issue of *Neuron*, indicates that the same protein is abundant in zebra finches in the parts of the brain responsible for song-learning, but then declines as the learning ceases.

"The amount of the protein appears to be correlated with song-learning activity," said Clayton. "This protein may provide a window into a very basic brain process. Our songbird studies suggest it may have a normal function to increase learning. Yet as a side effect, it also may make human brain tissue more susceptible to senile plaques."

Clayton and his colleague, Julia George, discovered synelfin protein after setting out to address a long-standing question about the behavior of birds such as canaries and zebra finches: Why do most songbirds learn their songs only during a particular time of their lives?

The researchers, whose work is supported by the National Institutes of Health, theorized that there may be changes in specific proteins within a key brain region known as IMAN.



Photo by Bill Wiegand

"This protein may provide a window into a very basic brain process."

Using recombinant DNA methods, they made a collection of probes for genes that encode songbird brain proteins. After analyzing the proteins one by one, the researchers picked synelfin to study because they found it was turned on in the IMAN region of zebra finches that were learning their songs, and then abruptly turned off. The bird learns its song when it is about a month old by listening to a tutor—usually its father.

Exactly how the protein works in songbirds, or in humans, is not known. However, "in humans, the distribution of synelfin is the best predictor yet of where senile plaques are mostly like to develop," Clayton said. "A normal, healthy brain has few, if any plaques; the more plaques you have, the sicker you are."

Synelfin and another protein, the amyloid precursor protein, give rise

to small peptides that make up the sticky, insoluble skeleton of the senile plaque.

Clayton and George have found at least one other clue potentially linking synelfin to Alzheimer's disease. Synelfin resembles apolipoproteins, molecules that mediate protein activity. Last year, others showed that the apolipoprotein E4, a major carrier of hydrophobic molecules in the brain, is a significant genetic risk factor for the development of Alzheimer's.

Clayton speculates that synelfin may be an essential factor in plaque formation and that it may interact with different apolipoproteins to influence the likelihood of senile plaques and Alzheimer's.♦

—Courtesy of Inside Illinois

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faculty updates...

May Berenbaum, professor and head of Entomology, gave incoming freshmen their first lecture at the UI during the New Student Convocation. This new event was created to welcome all 6,000 freshmen to campus and instill in them a sense of unity, purpose, and spirit as they embark on their academic careers.

Philip Best, professor of Molecular & Integrative Physiology, was appointed to the Physiology Study Section at the National Institutes of Health, 1994-1998. He also received the A. Paul Naney Research Award for 1995-96.

John Cheeseman and **Mary Schuler**, Plant Biology, and **Fred Delcomyn**, Entomology, were promoted to full professor, and **Andrew Belmont**, Cell & Structural Biology, was promoted to associate professor.

Susan Fahrbach, assistant professor of Entomology, was a visiting scholar at Williams College, Williamston, MA, and was a consultant on the use of insects in undergraduate neuroscience teaching.

Martha Gillette, professor of Cell & Structural Biology and Molecular & Integrative Physiology, was named to the Sleep Disorders Research Advisory Board of the National Heart, Lung, and Blood Institute at the National Institutes of Health. She was also recently elected a fellow in AAAS for her research in biological sciences.

Benita Katzenellenbogen, professor of Molecular & Integrative Physiology, was appointed to the Biochemical Endocrinology Study Section of the Division of Research Grants at the National Institutes of Health, 1995-1999.

Byron Kemper, professor of Molecular & Integrative Physiology

and Cell & Structural Biology, has been appointed to the Physical Biochemistry Study Section at the National Institutes of Health from 1994 to 1998.

Jordan Konisky, professor of Microbiology, was awarded a faculty fellowship from the Association of Western Universities to support his sabbatical studies in chemical engineering, University of California, Berkeley, and the Department of Energy Idaho National Engineering Laboratory. He is examining the origin of microorganisms in deep subsurface environments. He also has accepted the position of director of the Biotechnology Center on campus.

Paul Lauterbur, director of the Biomedical Magnetic Resonance Laboratory and professor of Molecular & Integrative Physiology and Biophysics, was granted honorary membership in the German Roentgen Society and was elected a senior member of the Institute of Electrical & Electronics Engineers, Inc.

Charles Miller, professor and head of Microbiology, was selected as a faculty mentor in the 1995-96 Undergraduate Research Fellowship Program sponsored by the American Society for Microbiology. He served as mentor to Janet Lindow, an undergraduate in his lab. Lindow received an award that covered 8 weeks of summer research and her travel to the 1996 ASM meeting in New Orleans.

Donald Ort, professor of Plant Biology, interim director of SOLS, and research leader for USDA-ARS, has been designated president-elect of the American Society of Plant Physiologists.

Gene Robinson, associate professor of Entomology, was awarded a Fulbright

Scholarship to study the molecular genetic analysis of social behavior in honeybees at Hebrew University, Jerusalem. He was also named a Beckman associate in the Center for Advanced Study for 1995-96 by the UI Board of Trustees.

Abigail Salyers, professor of Microbiology, was named a University Scholar.

David Seigler, professor of Plant Biology, is on sabbatical at the Institut für Pharmazeutische Biologie und Phytochemie, Westfälische Wilhelms-Universität, Muenster. He is isolating and characterizing bioactive cyanogenic compounds from a series of plants of phylogenetic interest.

O. David Sherwood, professor of Molecular & Integrative Physiology, will run in the 100th Boston Marathon in April 1996. He qualified in 3 hours, 10 minutes, and 35 seconds.

Tony Waldrop, professor of Molecular & Integrative Physiology and director of the Medical Scholars Program, is chairman of the UI Athletic Advisory Committee.

Carl Woese, professor of Microbiology, was elected a fellow of the American Academy of Microbiology. The academy promotes professional recognition and fosters the highest scientific standards among microbiologists. Fellowship is the academy's highest honor.

Carl Woese and **Gary Olsen**, associate professor of Microbiology, are participating in a \$3 million Microbial Genome Initiative by the US Department of Energy to analyze the genetic material in microorganisms that live in extreme conditions.

Ralph Wolfe, professor emeritus of Microbiology, won the Selman A. Waksman Award in Microbiology from the National Academy of Sciences. The award honors Waksman, a Nobel laureate who discovered streptomycin. Wolfe is the 14th recipient of the award. He was chosen for his work in understanding the biochemical pathway that reduces carbon dioxide to methane in microorganisms and for defining new biochemical pathways, enzymes, and cofactors. He is an international expert on anaerobic bacteria, particularly methanogens.

Colin Wraight, professor of Plant Biology and Biophysics, was awarded a Fulbright Research Fellowship to conduct low-temperature studies on site-directed mutations of the photosynthetic reaction center with Dr. André Verméglio and colleagues, at the Centre d'Etude Nucleaires, Cadarache, France.

Retirements in 1995 include **Floyd Dunn**, professor of Biophysics and Electrical & Computer Engineering, with 47 years of service; **James Heath**, professor of Molecular & Integrative Physiology, 32 years; **George H. Kieffer**, associate professor of Ecology, Ethology & Evolution, 29 years; and **Gilbert P. Waldbauer**, professor of Entomology, 43 years.♦

This newsletter is published annually by the School of Life Sciences, University of Illinois at Urbana-Champaign. Please send comments and suggestions to:

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World Wide Web *(continued from page 1)*

SOLS courses are using the Web to deliver syllabi, reading lists, lecture notes, and high resolution color images.

Students are able to access these materials from their dorm rooms, service computing sites, and SOLS computer-mediated learning spaces. Such access greatly extends the

biology maintains the Ribosomal Database Project, which offers data, program resources, and services via the Web. Other departments offer faculty biographies and descriptions of research facilities, course descriptions, seminar schedules, and admission applications.

Most importantly, however, is the

...they can take a quiz, review materials on the computer, and even e-mail queries to their instructors at any hour of the day or night.

time that students have to obtain lecture materials; they can take a quiz, review materials on the computer, and even e-mail queries to their instructors at any hour of the day or night.

In introductory biology and introductory plant biology classes, students can view lecture slides, review key words and concepts, find out appropriate text references, and look up office hours for teaching assistants, as well as other course information.

In Biology 122, the third in the introductory course sequence for biology majors, students are also able to take quizzes on-line. The programming for these Web sites is done primarily by students with help from the Office of Networked Information Technologies.

Also available from the SOLS web page is the Freshwater Ascomycetes Database, maintained by Dr. Carol Shearer, Plant Biology, which contains the names of ascomycetes species reported in freshwater habitats worldwide. Micro-

structure of the human relationships that are creating these new networked information systems, and which are created by these tools.

One of the more visual offerings, which takes full advantage of the Web's ability to display color and graphics, is Entomology's collection of insect drawings. These images were originally drawn on canvas as a WPA project during the Depression; they were used for teaching the more common insect orders for decades.

Recently, many of these images have been "rescued" by photographing and scanning them into the computer, where they are electronically "cleaned" by SOLS' Artist Service. They have been further enhanced by the addition of electronic links that provide taxonomic information for each species.

These irreplaceable resources are now available to educators and researchers throughout the world thanks to the collaboration of a number of people in SOLS.♦

alumni news...

1940s...

William C. Dolowy, DVM, (BS '48, MS Zoology '49) recently contributed material to the National Dental Museum, Baltimore, MD, on a technique he developed with John Lind, DDS, on taking and viewing 3-D radiographs in the dental office. He also contributed literature and photographs describing fluorescent porphyrin in the supragingival calculus of dogs and cats. Dr. Dolowy practices at the Animal Care Hospital of Mercer Island, Mercer Island, WA.

Donald Charles Goodman (BS '49, MS '50, PhD Zoology '54) retired in July 1995 as University provost and dean, Health Science Center at Syracuse, State University of New York, and has moved to Gainesville, FL.

1950s...

Stanley E. Leland, Jr., PhD, (MS Zoology '50) retired in 1993 from the Kansas Agricultural Experiment Station, Manhattan, where he had been Associate Director since 1975. He came to Kansas State in 1967 as a professor of parasitology. His 35 years of research contributions include both applied and basic publications in veterinary parasitology, especially nematode parasites and antihelminthics. He now reports that he specializes in "travel, hunting, fishing, sleeping in, eating out, domestic affairs, and moseying."

1960s...



Harris S. Goldenberg, MD, (BS Zoology '64) has been on the staff at Michael Reese Hospital, Dept. of Surgery, since 1976. He is a

clinical professor of surgery at the UIC College of Medicine, site coordinator for the junior surgical clerkship at Reese, and a member of the M3 Subcommittee for the College of Medicine.

Roland R. Roth (MS '67, PhD Zoology '71) is professor of Entomology & Applied Ecology, University of Delaware, Newark. He is studying wood thrush ecology in forest fragments and teaches and advises undergraduates and masters students in the wildlife conservation program. He received the University's Excellence in Advising Award in 1994. Daughter Sherry is working on her PhD at the University of Wisconsin, Madison with **Rick Lindroth (PhD Biology '84).**

1970s...

James Berg (BS Biology '75) patented a process for detecting microorganisms in water. The Colifast System allows analysis of water in a matter of hours, rather than days. He resides in Norway and is a senior scientist for Aquateam.

Randall L. Busch, MD, DDS, (BS Biology '79, BS Dentistry '81, DDS '83) is director of the Mercy Center for Pain Management and chair for the Dept. of Anesthesia, Dubuque, IA.

Donald G. Buth (BS '71, AB '72, MS '74, PhD Ecology, Ethology & Evolution '78) is a professor of biology at the University of California, Los Angeles. He teaches ichthyology, systematics, evolution, biology of vertebrates, and parasitology.

John H. Cissik (PhD Physiology '72) retired from active duty as an Air Force colonel with over 27 years of service. When he retired, he was the

director of clinical research for Wilford Hall Medical Center, Lackland AFB, San Antonio, TX. He is now serving as executive director of Clinical Research and director of the Center for Children Research Foundation at Medical City Dallas Hospital, Dallas, TX.

Mary Cecilia (Paletti) DeVany (BS Biology '76) is president and industrial hygienist of DeVany Industrial Consultants, Battle Ground, WA. She has been a consultant to businesses throughout the US in the areas of occupational health, safety, industrial hygiene, environmental affairs, and product/safety liability.

James R. Edgerton, MD, (BS Biology '74) is medical director of cardiac surgery at Saint Mary's Medical Center in Racine, WI. In 1993, he received the American Heart Association of Wisconsin volunteer of the year award for outstanding fund raising. In 1994, Wisconsin's governor presented him with the distinguished citizen award and he was also commended by the state legislature for his work in high quality, cost effective cardiac surgical care.

Jerome J. Epplin, MD, (BS Biology '71), who practices in Litchfield, IL, was named 1994 family physician of the year by the board of directors of the Illinois Academy of Family Physicians. He and wife Renee are parents of three children, Kate (17), Luke (16), and Rachel (14).

Capt. Alfred G. Harms, Jr. (BS Biology '71) commands the nuclear-powered aircraft carrier, the USS Nimitz, overseeing a crew of about 6,000.

Charlene Jett (MS Biology '72) is a management consultant in pharmaceu-

ticals and medical services. She lives in Carpinteria, CA.

Kenneth Klesh, MD, (BS Biology '76) is a clinical neonatologist at St. John's Mercy Medical Center, St. Louis, MO. **Ingrid** (BSN Nursing '79) is a school nurse, Rockwood School District, West St. Louis Co. They have three children, Andy (12), Brian (10), and Kristen (7).

James M. Lyznicki (BS Microbiology '79) is a scientist at the American Medical Association in Chicago, Dept. of Preventive Medicine & Public Health. He is developing reports and programs for physicians and their patients about environmental health and communicable diseases.

Jeffrey T. Mack (BS Biology '74) says he "took 20 years, but received his MD degree" in 1994 and is in emergency medicine residency in Pennsylvania.

Gregory A. Shove, MD, (BS Biology '75) is a rheumatologist practicing at All Saints Health Care, Racine, WI. He is president of the Racine Co. Medical Society and president-elect of the Wisconsin Society of Internal Medicine.

Jeffrey R. Thompson, MD, (BS Biology Honors '78) is a nephrologist in Dallas, TX. He and wife Mayra (MD '80) have four children. He recently started his own practice while continuing as clinical assistant professor at the University of Texas Southwestern Medical School.

M. Cheena Wade (MS Biology '76) was named 1995 Illinois professor of the year by the 1995 Carnegie Foundation for the Advancement of Teaching U.S. Professors of the Year Program. She is an associate professor of biology at the College of Lake County, Grayslake, IL. She also is president of the Lake County Conservation Alliance.

1980s...

Marc Applebaum, MD, (BS Biology '84) is a resident physician at the Rehabilitation Institute of Chicago, the top rehabilitation hospital in the country according to *U.S. News & World Report's* 1994 listing of "America's Best Hospitals."



William M. Baader, MD, (BS Biology Honors '81) has been in solo practice in plastic surgery in Bellingham, WA, since 1993. He is a 1985 graduate of UIC College of Medicine and was board certified in general surgery in Seattle in 1991.

Mark A. Boudreau, PhD, (BS Biology '80) is assistant professor of Botany at Eastern Illinois University, Charleston. He teaches plant pathology, agroecology, and environmental biology. His research is in diseases in heterogeneous communities and educational software.

John Earl (BS Biology '89) is the youngest priest in the Rockford Roman Catholic Diocese and is serving St. Joseph Parish, Elgin, IL.

Kimberly A. Hogan, MD, (BS Biology '90) is in family practice residency at Abington Memorial Hospital, PA.

Michael Z. Meer (BS Biology '83, DDS '89) is an attending oral and maxillofacial surgeon at UIC College of Dentistry and is in private practice in Highland Park, IL.

William S. Modi (PhD Ecology, Ethology & Evolution '84) is conducting research in mammalian genetics at the National Cancer Institute, Frederick, MD.

Howard Benjamin Oller (BS Ecology, Ethology & Evolution '89) is working as a crisis counselor and therapy group leader for AIDS victims and their friends and families at the AIDS Care Alliance in Chicago. "It is the most satisfying and fulfilling work I have ever done."

Yasemin Ozcan (BS Biology '85, MD '89) and **Allan Ruby** (MD '90) finished their residencies in June 1994 and both are working at the South Bend Clinic in South Bend, IN. Allan has joined a four-physician ob/gyn practice and Yasemin is director of physical medicine and rehabilitation. They have two sons, Nathan (4) and Joel (1).

Christina L. Peavey (BS Microbiology '89) received the Dr. H. Preston Hoskins Scholarship from the UIUC College of Veterinary Medicine in 1995 for proficiency and expertise in technical writing and/or editorial service for veterinary publications written while in veterinary school.

Paul Reger, MD, (BS '83, MS Biology '85) is in family practice in Lebanon, IL, and is assistant professor of family and community medicine at Southern Illinois University, Belleville.

Maj. Walter F. Rongey, DMD, (BS Biology '83) is a US Army dentist. He is in charge of the US Army Dental Clinic at Camp Hialeah in Pusan, Republic of Korea.

Joe A. Santiago, MD, (BS Biology '86) was chief resident for St. Louis University Hospital. He began private ob/gyn practice in the summer of 1995 in New Castle, IN. He and wife Melissa are the proud parents of daughter, Alanna (1).

Renee Sherman (BS Ecology, Ethology & Evolution '84) finished an MS degree in the School of Natural

Resources & the Environment, University of Michigan, in 1994. She is working on a PhD with Dr. John B. Burch at the UM Museum of Zoology, studying freshwater mussels.

William Small, Jr., MD, (BS Biology '86) in 1994 received the compassionate care award given by the Women's Board of Northwestern Memorial Hospital, Chicago, IL. He finished his residency in radiation oncology in June 1994 and has an academic appointment at Northwestern Memorial. He, wife Julie, and daughter live in St. Charles, IL.

Myron I. Wolf, DPM, (BS Biology '86) is a foot and ankle surgeon in Lake Forest, Highland Park, and Elk Grove Village, IL. He is on staff at Alexian Brothers Medical Center, Lake Forest Hospital, and Highland Park Hospital. He graduated magna cum laude from Scholl College of Podiatric Medicine in 1990.

1990s...

Melissa M. Alexander (BS Biology '91) and **Gina Hanfland** (BS Biology '91) were recipients of Dr. J.E. Salsbury scholarships for 1994-95, awarded to students at UIUC College of Veterinary Medicine for superior scholarship, initiative, perseverance, and leadership potential. Alexander also received the American College of Veterinary Radiology award for outstanding enthusiasm and understanding in diagnostic and therapeutic radiology. They are both members of Phi Zeta, the national veterinary honor society.

Donald M. Bailey, MD, (BS Biology '90) is in internal medicine residency at the University of Arkansas for Medical Science, Little Rock.

James G. Cunnar, MD, (BS Biology '90) is in family practice residency at Memorial Hospital, South Bend, IN.

Kristi Evans (BS Cell & Structural Biology '91) is running a massage therapy business, *HANDS ON*, in a fitness center in Hoopston, IL.

Susan Kay Fife (BS Cell & Structural Biology, Anthropology '91) is clinical laboratory coordinator of the muscle/nerve lab in the Dept. of Neurology, Medical College of Wisconsin, Milwaukee. She tied for first place in UW School of Allied Health Professions' 1993 student scientific poster competition.

Diedre A. Flanagan, MD, (BS Biology '90) is in general surgery residency at Blodgett Memorial Medical Center, Grand Rapids, MI.

Candace Fortune, MD, (BS Biology '90) is in psychiatry residency at Wake Forest University's Bowman Gram Medical School, Winston-Salem, NC.

Bradley K. Gillespie, PharmD, (BS Microbiology '94) is working at the Food & Drug Administration as a pharmacist, reviewing new drug applications, in Rockville, MD.

Deborah C. (Neeson) Jilek (BS Biology '92) was recipient of a Dept. of Energy applied health physics fellowship, 1992-1994. She received an MS in health physics from Purdue University in 1994 and is currently employed at Argonne National Laboratory near Chicago, IL.

Bradley Eric Krohn (BS Biology '92) is a medical student at Ross University of Veterinary Medicine, St. Kitts.

Christina Medrano, MD, (BS Biology '90) is in general surgery residency at Southern Illinois University affiliated hospitals in Springfield, IL.

Randall A. Megeff, MD, (BS Biology '90) is in family practice residency at UIUC College of Medicine, Urbana.

Matthew L. Peecher, MD, (BS Biology '90) is in internal medicine residency at SIU affiliated hospitals in Springfield, IL. He then plans an anesthesiology residency at Mayo Graduate School of Medicine, Rochester, MN.

Scot A. O'Donnell, DDS, (BS Biology '90) is a resident at the University of Oklahoma Health Science Center specializing in orthodontics.

Tom Seibert (PhD Ecology, Ethology & Evolution '90) is an environmental education specialist at the University of Nebraska, Lincoln. He works with 4-H youth development, the Nebraska Forest Service, and Project Learning Tree, a nationwide environmental education program. "Enhancing environmental knowledge of K-12 students is my primary responsibility." He was a visiting assistant professor at UNL studying community diversity in the wetland meadows along the Platte River. He has also studied the ecology of the Sand Hills.

Donna Marie Smith (BS Biology '94) is a mental health counselor at University Hospital, a behavioral science facility on the west side of Chicago. She is working in crisis intervention with substance abuse and psychiatric clients.

Mark J. Spoonamore, MD, (BS Biology '91) is an orthopedic surgery resident at the University of Iowa Hospital & Clinics, Iowa City.

Barry A. Sommerfield, MD, (BS Biology '90) is in pediatrics residency at Lutheran General Hospital, Park Ridge, IL. ♦

Director's Perspective *(continued from page 2)*

Our enrollment of nearly 2,200 is the largest major in LAS. With another 2,000+ non-majors enrolling in SOLS courses, we are finding that our departmental structure resists efficient deployment of SOLS faculty and other instructional resources to meet this enormous demand, particularly at the introductory level. It is a remarkable fact that in the recently released National Research Council ratings for graduate education and research in life sciences, 36 of the 37 individual rating categories were new since 1983 when this rating was last compiled. This is a vivid illustration of how rapidly and fundamentally life sciences research is evolving. In general, we have done remarkably well in keeping pace in these revolutionary times; in some areas SOLS faculty lead the way in defining new research frontiers. However, there are mounting reasons to be

concerned that our current organizational structures may prevent us from remaining at the forefront.

During the past 2 years, SOLS faculty have been discussing the best administrative structures and departmental organizations to configure life sciences at UIUC for the challenges of the next decade and beyond. A proposal has emerged from a broadly based faculty committee for reorganizing SOLS into a substantially reduced number of free-standing departments. This plan has been endorsed in concept by LAS Dean Jesse Delia and is now being considered by our faculty. With the professional endeavors, careers, and livelihoods of nearly 100 faculty, 500 graduate students, 2,200 undergraduates, 140 academic professionals, and 70 staff in the balance, these are very important decisions. That some departments which have more than

100 years of history and traditions would disappear in the proposed reorganization ensures that the decisions will be emotive and stressful. While some want to know why we are devoting such effort and emotional resources in attempting to fix a system that "ain't broken," others see new horizons for life sciences possible only through substantive reorganization. It is too early to predict the eventual outcome, but by this time next year, there may be a very different incarnation of life sciences standing in the footprint of SOLS. Thoughts of reorganizing our familiar academic surroundings can be very disconcerting, but at the same time it is exciting to consider that we are launching life sciences at UIUC into a new era and a new century.



let us hear from you...

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Undergraduates Excel

Chancellor's Scholar **Susanne Ahmari**, senior double major in biology honors and biochemistry, was named one of *Glamour's* "Top Ten College Women." This annual contest awards \$1,000 scholarships to full-time female juniors who excel in leadership experience, personal involvement in community and campus affairs, and academic excellence. She also received an all-expenses-paid trip to New York City for the award ceremony, plus a featured profile in *Glamour's* October issue.

Susanne works under the supervision of Dr. William Greenough and is a chemistry tutor for the Athletic Department. She has had four consecutive summer research internships, is a member of *USA Today's* All-USA Academic (Third) Team, and has won Phi Eta Sigma and Barry M. Goldwater Scholarships.

Janet Lindow, senior in Microbiology, was awarded a \$2,500 undergraduate fellowship from the American Society for Microbiology to conduct research on protein degradation in the life cycle of salmonella bacteria cells. Only 10 students from the nation's major research universities were awarded these fellowships.

The award provided Lindow a stipend to cover 8 weeks of summer research. She plans to continue her research until December, when she will prepare an abstract of her results. If accepted, she will present her research at the ASM's general meeting next spring in New Orleans.

According to Lindow, the study of protein degradation contributes to a better understanding of how proteins regulate certain genes. Charles Miller, head of Microbiology, is Lindow's faculty mentor.

Sara Browning, a senior in plant biology, received a \$2,000 grant from the Microscopy Society of America to conduct research on the preferential growth of the yeast *Candida albicans* on different carbon substrates, and the relative adhesion resulting when these cells were in contact with human buccal cells.

The study resulted in her submitting a poster presentation and published abstract at the 1995 meeting of the Society, held in Kansas City in August. Her poster won third place in the Diatome Awards for best use of ultramicrotomy in research. Co-authors were Richard Crang, professor of Plant Biology, Aaron Burns, also an undergraduate student, and Charles Vossbrinck, visiting assistant professor in Agricultural Entomology.♦

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.....*alumni newsletter*

New Chemical & Life Sciences Laboratory to be Dedicated on April 25



Photograph by Paul Mortensen

The new walk that was California Street. To the left (north) is the Life Sciences "side" and to the right is the Chemical Sciences "side" of the Chemical & Life Sciences Laboratory. The fourth floor bridge frames Krannert Center for the Performing Arts (the set of windows in the center of the picture) on Goodwin Avenue.

The opening of the state-of-the-art research facility and the largest capital project undertaken on the Urbana-Champaign campus, the Chemical & Life Sciences Laboratory, will be celebrated on Friday, April 25, 1997. Located at the corner of Oregon Street and Goodwin Avenue, it houses research laboratories, faculty offices, and support services for School of Life Sciences' departments of Microbiology and Cell & Structural Biology, and School of Chemical Sciences' departments of Biochemistry and Physical & Inorganic Chemistry. This 227,500-square-foot facility significantly enhances both undergraduate and graduate instruction and research on this campus.

You are invited to attend the dedication ceremonies, which will begin at 9:30 AM in Foellinger Auditorium (south end of the Quad). Following the opening remarks, a ribbon cutting ceremony, reception, and tours will take place at the entrance to the Chemical & Life Sciences Laboratory at 601 South Goodwin Avenue, across the street from the Krannert Center for the Performing Arts. Mark your calendar now and please plan to join us for the dedication ceremonies!

If you have questions or need more information about the event, please call David Johnson, Sheila Pirkle, or Pamela Christman, College of Liberal Arts & Sciences Development Office, 217/333-7108.♦

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A New School of Integrative Biology

by Susan Fahrbach
convenor of SIB Working Group



Since I joined the faculty in 1990, the School of Life Sciences has engaged in self-evaluation, soul-searching, and internal discussions regarding its future to such an extent that I wondered if UIUC biologists had been overcome *en masse* by end-of-millennium fretfulness or an incessant need to philosophize regarding specific

local manifestations of the human condition. I am happy to report that, with hindsight, these deliberations were much more pragmatic. The years of discussion have now flowered into the reorganization of the School of Life Sciences into the School of Integrative Biology (SIB) and the School of Molecular, Cellular, & Physiological Biology (MCPB). This reorganization provides a clearer administrative identity for distinctive subdisciplines in biology, fosters faculty participation in decision-making and governance, strengthens graduate education, and offers undergraduates new curricular choices.

I was privileged to serve as convenor for the working group that shaped SIB during the past year. Faculty representatives from Entomology, Plant Biology, and Ecology, Ethology & Evolution worked together to preserve traditional departmental strengths while seeking mechanisms for greater coordination of undergraduate teaching and faculty hiring. The plan for SIB approved by the faculty has the following notable features.

First, SIB will consist of three taxon-defined departments: Entomology, Plant Biology, and Vertebrate Biology & Evolution (the latter will replace the department of Ecology, Ethology & Evolution). These departments will share responsibility for undergraduate teaching and all its courses will be offered under a single "SIB" rubric. The undergraduate curriculum

will be designed to provide students with comprehensive training in biology paired with opportunities for advanced courses in ecology, evolutionary biology, and all aspects of insect-plant biology.

Second, SIB will be home to a new program in Ecology & Evolutionary Biology. It will provide an opportunity for ecologists now scattered in taxon-based units across campus, including affiliates from the Illinois Natural History Survey, to offer a cohesive graduate program. It will also provide a strong biology "interface" with other campus-wide efforts in the environmental sciences.

Finally, all future faculty hirings in SIB will be coordinated at the school level, in accord with a strategic plan for investment.

There will be ample need and opportunity for communication between the two new schools. Committees are currently working to coordinate undergraduate curricula to be offered by each school.

Like others, I originally doubted the wisdom of partitioning SOLS. I have felt that SOLS' strength lay in its diversity of research areas and the number of its graduate programs. What I came to appreciate through many hours of working with my colleagues is that the very success and explosive growth of modern biology has divided faculty into disciplines with differing priorities. These priorities do not always map neatly onto departmental boundaries and cannot be ranked as higher or lower in any absolute sense—UIUC, for example, needs to grow in areas as diverse as the molecular basis of development and the biological aspects of global change. Faculty will now work and plan in smaller communities that share common priorities.

SIB takes on special commitments to promote ecology, to nurture its traditional taxon-based units, and to provide a broad undergraduate education in biology that spans from molecules to ecosystems. I have confidence that both units will continue to share a commitment to excellence as we enter the 21st century. ♦

Biology at Illinois:

A New School of Molecular, Cellular, & Physiological Biology

by David Clayton

convenor of MCPB Working Group



The reorganization of Life Sciences faculty is propelled by the unprecedented revolution in biological sciences of the last few decades. This revolution has had two complementary consequences. In one direction, analysis of the underlying molecular organization of cells has revealed a fundamental *unity* of life. Organ-

isms that seemingly are very different—bacteria, fruit flies, and humans, for example—share many deep similarities in the proteins that make them up and in the regulatory processes that govern their development and function. This perspective forms the basis of the new School of Molecular, Cellular, & Physiological Biology (MCPB). Equally important is the enormous *diversity* of life, and the profound degree to which organisms of one species interact with, influence, and depend upon organisms of many other species. The study of organisms in their unique ecological and taxonomic contexts defines the perspective of the new School of Integrative Biology (SIB).

The initiative to reorganize stems not just from a looking-backward, but also from a looking-forward approach. Many pressing problems of modern society have their roots in biology, and the biological sciences offer the best hope of addressing and solving them. Two somewhat arbitrary examples are the “graying of the baby boomers” and the need for new medical approaches to contend with aging; and the severe ecological burdens an enormous human population places on regenerative capacities of the earth’s ecosystem. These problems (and many others) demand an aggressive and coherent attack by scientists to analyze the basic mechanisms of life, to educate others, and to help develop creative solutions to practical problems.

Recognizing these historical trends and imperatives,

life science faculty set about some years ago to determine whether its organizational structure was optimal for the challenge at hand. In the specific context of MCPB, faculty in the departments of Microbiology, Molecular & Integrative Physiology, and Cell & Structural Biology recognize that we are more alike than different. We share the same sources of grant support, we teach many of the same types of courses, and our students (at both graduate and undergraduate levels) are often equally interested in the problems and perspectives of the other departments. We also share an interest in promoting the further growth of the subdiscipline coming to be known as “structural biology”—the study of the physical organization and function of the macromolecular components of cells.

The proposed organizational structure of MCPB preserves traditional departmental identities but merges them into a single cohesive decision-making unit, the School of Molecular, Cellular, & Physiological Biology. A streamlined mechanism will be put in place for evolving new areas of disciplinary focus, and we will apply this immediately to establish a new Division of Structural Biology. Currently, each department is essentially autonomous with regard to budgetary planning, undergraduate curriculum, faculty recruiting, *etc.* In MCPB, the Director will have practical authority and responsibility for most academic functions. The consensus view is that this “federal” structure will instill a degree of vision, vigor, and coordination that has been difficult to achieve under the loose confederacy of SOLS.

The reorganization of Life Sciences faculty has been a long time in coming—literally years of discussions and deliberations leading up to its formal faculty endorsement in fall 1996. These developments at the University of Illinois are not unique, and are signs of a healthy and dynamic university community adapting to the rapid changes, new demands, and fresh opportunities of our modern world.♦

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through the 7th annual campaign for the Robert Emerson Endowment, the SOLS Enhancement Fund, and the Biology Library Endowment Fund; the LAS annual fund; and other designated gifts.

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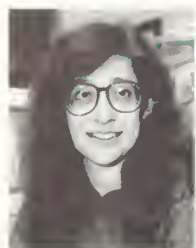
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faculty updates...



May Berenbaum, professor and head of Entomology, was appointed a professor in the Center for Advanced Study. Professors in the

Center are permanent members of the center community, chosen for their outstanding scholarship. Berenbaum pioneered the area of interaction and co-evolution of insects and their plant hosts. In 1996, she was elected as a Fellow of the American Academy of Arts & Sciences and to the American Philosophical Society.

She was also awarded the 1996 Medallion of Honor by the Mothers Association. The Medallion pays tribute to those individuals who, by example and service, have used their talents to enrich the lives of others.

Finally, she was named among the campus' first recipients of a Swanlund Endowed Chair. The Chair will provide her with a salary stipend and support funds for her research.

John Cheeseman, professor of Plant Biology, received the College of Liberal Arts & Sciences Academic Advising Award for 1996. The award recognizes and encourages quality advising of undergraduate students.

David Clayton, associate professor of Cell & Structural Biology, and **Evan DeLucia**, associate professor of Plant Biology, were honored as University Scholars during the UI Foundation's 61st annual meeting in October 1996. The program recognizes excellence while helping to identify and retain the University's most talented teachers, scholars, and researchers. Clayton has pioneered song-learning in birds as a model to study how nerve cells store information. DeLucia is recognized internationally for his contributions to

understanding how the environment affects tree physiology.

Richard Davenport, professor of biology, retired in May 1996 after 33 years at the University.

Martha Gillette, professor of Cell & Structural Biology, was selected as a Center for Advanced Study associate for the academic year 1996-97. The appointment provides time for creative work on scholarly research. She plans to work on the regulators of the brain's circadian clock.

Govindjee, professor of Biophysics & Computational Biology and Plant Biology, was awarded a Fulbright grant to lecture and conduct research in India during 1996-97.

His research will focus on how plants protect themselves from stress in our environments. He also received the Dr. Nuggihalli Narayana Memorial Lectureship for 1996 at the Indian Institute of Science, Bangalore.



Benita Katzenellenbogen, professor of Molecular & Integrative Physiology and Medicine, received the 1996 Scientific Distinction Award from the Susan

G. Komen Breast Cancer Foundation in October. She is an expert on hormone-dependent cancers and a leading researcher in the areas of estrogen receptors and actions of the anti-estrogen drug tamoxifen.

Jordan Konisky, former director of SOLS and professor of Microbiology, is now Vice-Provost for Research at Rice University, Houston, TX.

In September, the Society of General Physiology celebrated its 50th anniversary. Of the 212 charter members, **C. Ladd Prosser** is the only one who is still an active member of the Society. He was awarded a 50-year plaque.

Gene Robinson, associate professor of Entomology, was elected as a 1996 Fellow in the American Association for the Advancement of Science for his work on the mechanisms of behavior in social insects, particularly the division of labor among honey bees.

Gilbert Waldbauer, emeritus professor of Entomology, recently published *Insects through the Seasons* (Harvard Press, 1996). Written for non-biologists, the book takes readers through the four seasons, describing life cycles and adaptations to weather changes of a multitude of insects.

Ralph Wolfe, emeritus professor of Microbiology, received the 1996 Abbott-American Society for Microbiology Lifetime Achievement Award.



Faculty promoted in 1996 were: **David Clayton**, from assistant to associate professor in Cell & Structural Biology; **Susan Fahrback**, from assistant to associate professor in Entomology; **Jonathan Henry**, from assistant to associate professor in Cell & Structural Biology; **Sondra Lazarowitz**, from associate to full professor in Microbiology; **Stanley Maloy**, from associate to full professor in Microbiology; **Shankar Subramaniam**, from assistant to associate professor in Molecular & Integrative Physiology; and **James Weyhenmeyer**, from associate to full professor in Cell & Structural Biology. ♦

Goodwin Avenue, Then and Now...



The face of biology at the University of Illinois is not the only thing that has changed on campus. If you were here in 1952 you might recognize Goodwin Avenue in Urbana—they were just getting ready to pave it. The view is of Goodwin looking south from Illinois Street.

The same view today, with Morrill Hall (right foreground) and the new Chemical & Life Sciences Laboratory. On the left, hidden by the trees, is Kraamert Center for the Performing Arts. At the end of the street is the Edward R. Madigan Laboratory.



Goodwin Avenue in 1952, with the photographer at Nevada Street looking north.



The same view today, with the Chemical & Life Sciences Laboratory on the left and some commercial properties on the right.



alumni news...

1950s...

Julius S. (MS '51, PhD Zoology '55) and **Joette (Mason) Greenstein** (BS Zoology '54) are now residing in Newark, OH. He retired in 1995 as president of Central Ohio Technical College and dean/director at The Ohio State University. He continues to teach full-time as professor of Zoology at OSU.

1960s...



James A. Bauer (BS Zoology '65) retired from Bell System (Ameritech) after 30 years and started a second career with ANTEC Corp. as senior vice president, Administration & Communications. He resides in Lake Forest, IL.

Thelma M. Evans, MD, (BS Biology Honors '67) is a staff physician with Humana HMO, Chicago, IL. She also serves on the Quality Assurance Committee for Little Company of Mary Hospital in Evergreen Park. In January 1996, she was elected a fellow of the American College of Physicians. Twin daughters, Catherine E. and Cynthia M. Evans, graduated from UIUC in 1994.



Bill Keppler (MS Biology '61, PhD Genetics '65), after serving 16 years as Dean, returned to the faculty of Public Health at Florida International University. He received the Rev. Dr. Martin Luther King Peace Award for 1996 for his work with African American students from Minority Student Services at FIU.



Robert J. Steigmann, JD, (BS Zoology '65) currently serves as judge for the Illinois Fourth District Appellate Court. His chambers are in Urbana. He and wife Sherry (Waxman) (BA '66, MS '68) have two children: Michael (BA '90), who has an MS in Economics from the London School of Economics and a JD from Harvard Law School; and Laura who is currently a graduate student at UIUC in Teaching of English as a Second Language. Judge Steigmann notes that he is the only one of his immediate family who did not graduate with honors from college or graduate school. He suggests that this may account for his pursuing law school in 1965 after getting his BS, instead of medical school as he had originally intended.

1970s...

Richard A. Berkowitz, MD, (BS Biology '79) is director of Pediatric Anesthesiology at UI-Chicago. He is also an assistant professor of Anesthesiology & Pediatrics, and spends additional clinical time in Pediatric Critical Care.

Ken Bezan, DMD, (BS Microbiology '76) is an endodontist with Bezan & Warden Endodontics, Tulsa, OK. He is married to Debra (BS Psychology '75, MEd Educational Psychology '76), who is a professor of Optometry at Northeastern State University. They have one child, Kelly (age 3).

Julie A. (Szczepanski) Deisinger (BS Microbiology '75) received her PhD in clinical psychology from the Illinois Institute of Technology in May 1996. She and husband Bob (BS

Accounting '74) have four children: Rob (17), Heather (17), Valerie (15), and Kathryn (9).

Jeffrey Mack, MD, (BS Biology '74) reported, that although it took 20 years, he received his MD degree in 1994 and was doing his residency in emergency medicine in Pennsylvania.

Jan Schweitzer (BS Zoology '75) is zoo director, Glen Oak Zoo, Peoria, IL. She was elected to the Board of Directors, American Zoo & Aquarium Association in 1994.

1980s...

Ava V. Ackerman, DVM, (BS Biology '89) is an associate veterinarian in small animal/exotic animal practice in Madison, WI.

David A. Brenningmeyer, JD, (BS Biology '86) is an appellate attorney with the US Dept. of Veterans Affairs, Washington, DC. He adjudicates primarily appeals on veterans' claims for medical benefits.

Leon P. Campos, MD, (BS Biology '87) is a family physician with Advocate Medical Group of Lutheran General Hospital, Park Ridge, IL. He has offices in Arlington Heights and Des Plaines.

Robert Cusik, MD, (BS Biology '86) is a resident physician in orthopedics in Wichita, KS.

Martin Dubravec, MD, (BS Biology '84) is a clinical instructor of medicine at the Uniformed Services University of Health Sciences Medical School, Bethesda, MD. He is a staff physician at Walter Reed Army Medical Center and is also a fellow in the Allergy & Clinical Immunology training program.

Donald J. Fee, DDS, (BS Biology '86) is in private practice in Geneva and Sugar Grove, IL. He, wife Georgia, and son Matthew live in Batavia.

Lauren M. Goralski, MBA, (BS Biology '82) is assistant vice chancellor for research and technology manager for research and technology manager for UIUC. She acts as a liaison to facilitate university/industry/government research initiatives, negotiates intellectual property terms in contracts with research sponsors, and promotes development and marketing of inventions and discoveries of UIUC researchers.

Amy Koshoffer, MS, (BS Biology '89) taught math and science in a secondary school in a remote village in Lesotho Southern Africa for 2 years as a Peace Corps volunteer. She then accepted a position as senior lecturer in mathematics at the National Teachers Training College in the capital city of Maseru. She plans to return home in early 1997, but until then her address is: Amy Koshoffer c/o Flamm, Lerotholi Poly Technical, Box 16, Maseru 100, Lesotho Southern Africa.

Michelle Medhurst, DVM, (BS Biology Honors '81) heads a staff of five veterinarians working for the largest full-service humane society in the Midwest, the Anti-Cruelty Society in Chicago's Near North Side.

Gina (Moresco) Morley, MS, (BS Biology '85) is a genetic counselor and program coordinator for the Department of Medical Genetics, Rockford Memorial Hospital, Rockford, IL.

Howard Benjamin Oller (BS Biology '89) is an ecologist and regulatory specialist with the Chicago District of the US Army Corps of Engineers, Regulatory Branch. Please note this correction from the last newsletter.

David L. Peterson (PhD Botany '80) is a professor of forest ecology at the University of Washington, and is unit leader for the Cooperative Park Studies Unit. He is researching the impacts of climate change, fire disturbance, and air pollution on forest ecosystems, with emphasis on national parks and wilderness. He teaches courses on forest ecosystems and dendrochronology (tree-ring analysis).

Maj. Walter F. Ronney, DMD, (BS Biology '83) is the officer-in-charge (and sole dentist) at the US Army Dental Clinic, Camp Hialeah, Pusan, Korea. He, wife Cindy, and children Matthew and Josephine expect to leave Korea in January 1997.

William Small, Jr., MD, (BS Biology Honors '86) was named Schaumburg High School's Distinguished Alumnus for 1996. He is an attending radiation oncologist at Northwestern Memorial Hospital in Chicago, and an assistant professor of radiology at Northwestern Medical School.



Garrett B. Smith, DDS, (BS Biology '86) is in private practice in Wilmington, IL. He served 2 years as a Lieutenant in the US Navy and was stationed in Japan.

Risa M. Stack, PhD, (BS Genetics, '89) was selected by the Center for Entrepreneurial Leadership, Inc., at the Ewing Marion Kauffman Foundation as a Kauffman Fellow in March 1996. This fellowship is designed to enable talented and motivated individuals to learn about the seed and early-stage venture capital process



through a 2-year fellowship with a carefully selected venture capital firm. She will be working with Chemical Venture Partners, NY. She has been a scientific consultant for ARCH Development Corp., the licensing and technology transfer office of the University of Chicago, and a derivative specialist on the financial trading floor of the Chicago Board of Trade for Goldenberg, Hehmeyer & Co.

David Stone (MS Entomology '84), biology teacher at University High School, Urbana, IL, served as the adviser to three students, Daniel Beedy, Balázs Bognár, and Richard Lin, who were awarded a Toshiba/National Science Teachers Association Explora Vision Award for the development of an advanced prosthetic technology arm. More than 5,000 teams entered the competition and four teams were chosen for first-place awards. Each student received a \$10,000 savings bond for their education.

Daniel A. Volkening (BS Biology '83) is a chiropractic physician in Chicago. He, wife Claudine, and children Julian and Camille live in Berwyn, IL.

1990s♦♦♦

Paul C. Durbin, MD, (BS Biology '91) is a resident in Internal Medicine at Johns Hopkins Bayview Medical Center, Baltimore, MD.

Clay Hinrichs (BS Bioengineering/Electrical Engineering '93) is attending St. Georges University School of Medicine, St. Vincents, West Indies.

Omar Jassim (BS Biology '97) was awarded a 1996 Barry M. Goldwater Scholarship, which provides \$7,000 toward his education expenses. He has been working with Dr. Gene Robinson, Entomology, on changes in hormone levels in bees as they age.

Joseph A. Kath, MS, (BS Biology '91) is a project manager in the Endangered Species Program with the Division of Natural Heritage, Illinois Department of Natural Resources.

Lana Keistler, MD, (BS Biology '91) is a dermatology resident at Southern Illinois University affiliated hospitals in Springfield.

Sokar Sia Kendor (BS Biology '91, MS Community Health '95) is attending UIC College of Medicine and plans to graduate in May 1999.

Christopher S. Murphy, MD, (BS Biology '90) is a pathology resident at St. John's Mercy Medical Center, St. Louis, MO.

Dale S. Pope (BS Biology '91) graduated from Northwestern University Dental School with a DDS degree in 1995. He is in a residency at Northwestern which will lead to a specialty certificate in orthodontics and dentofacial orthopedics and a MS in oral biology.

Kelly (Kristan) Rodkey (BS Biology Honors '92) is a technical specialist working on a chemiluminescent assay for screening blood for HIV at Abbott Laboratories. She is also pursuing an MBA at Keller Graduate School.

David Rubin, MD, (BS Biology Honors '90) is a junior resident in Internal Medicine at the University of Chicago Hospitals. He has been named chief medical resident for 1998.

Allen F. Sanborn (BS Biology '83, MS Biology '84, PhD Physiology '90) is an associate professor of biology at Barry University, Miami Shores, FL, where he was selected as the outstanding faculty member in April 1996.

Alan Schroeder (PhD Entomology '90) is a technical advisor to USAID Africa Bureau's emergency locust control project and travels extensively in Africa. After graduation, he spent a year as a postdoctoral fellow at the International Maize & Wheat Improvement Center in Mexico and 2 years in Africa on a AAAS fellowship.

Michelle A. Silkowski (MS Biology '90) is a toxicologist with Capital Environmental, an affiliate of the law firm of Howrey & Simon, Washington, DC. She is also a degree candidate at Johns Hopkins University in the School of Hygiene & Public Health. Her address is 4521-D 28th Road South, Arlington, VA 22206.

Dana Tarandy, MD, (BS Biology '90) is an orthopedic surgery intern at the University of Illinois Chicago Hospital.

Sam Volchenbom (BS Biology Honors/Biochemistry '91) is in the MD/PhD program at Mayo Clinic, Rochester, MN. He expects to receive his degrees in 1998. He and wife Julie had their first child in May.

Erik A. Whitfield, MD, (BS Bio-engineering '91) is a resident in internal medicine and psychiatry at Tulane University Medical Center, New Orleans, LA.♦

Procter & Gamble Endows Student Research Awards in the Life Sciences

Procter & Gamble Company has established an endowment to support awards for both doctoral and undergraduate students who have demonstrated excellence in research and in the presentation of their research findings. Starting in spring 1997, two undergraduate students (one each in life sciences and chemistry) and two doctoral students will be selected by a team of UIUC faculty and P&G scientists to receive awards. Criteria for selection will be the quality and presentation of their research.♦

Undergraduate Award Endowed by High School Biology Teacher

Mildred Parizek Zukor has established an endowment for annual undergraduate student awards in the life sciences, as well as for the biology library and the Museum of Natural History. She credits her love of learning, particularly about the life sciences, with her decision to support student awards. Mrs. Zukor earned a BS in 1932 in general curriculum and an MS in zoology in 1937 from UIUC. Under the mentorship of Professor Harley J. Van Cleave, Millie studied acathacephalus and other parasites. She taught biology at Morton High School in Cicero, Illinois, for 30 years. After "retiring" in 1963, she taught for an additional 13 years at Morton Community College. She now resides in West Chester, Illinois. Mrs. Zukor's son, Paul, who is also an alumnus (BS Accounting '74), and wife Suzanne live in Houston, Texas.♦

Harley Jones Van Cleave Fellowship Awarded

Ruth R. (BS Library School '30) and Malcolm S. Ferguson (PhD Zoology '37) have established an endowment to support a fellowship in the memory of Malcolm's mentor, Harley Jones Van Cleave.

Van Cleave was one of the earliest PhD graduates in zoology, receiving his degree in 1913. He spent his entire career at UIUC, rising from instructor to research professor. Van Cleave also served as head of the department of Zoology. He retired in 1952 and died in 1953. Van Cleave established UIUC as a leader in the field of parasitology, and was known by his students as both a demanding and a generous mentor.

In the spirit of Van Cleave's excellence in scholarship, research, and teaching, a student is selected annually to receive this \$1000 fellowship. The 1996 recipient was Jennifer Wiedenman who is pursuing a PhD in the Molecular & Integrative Physiology. Working with Dr. Richard Tsika, she is studying molecular aspects of muscle adaptation.

The Fergusons also provide scholarships for students in the Theta Xi Fraternity at UIUC, and have created endowments at the University of Western Ontario and

Van Cleave in 1947. "The way Professor Van Cleave taught, you wanted to know. It was as painless as being struck by a butterfly...He made us hunger for knowledge and then he fed us..." —Gene Shalit, C-U Courier, Sept. 23, 1956



at Eureka College. Their generosity is an extension of their life-long dedication to public service.

Malcolm's career included service at the National Library of Medicine, Bethesda, MD; the Center for Disease Control, Atlanta, GA; and Walter Reed Hospital, Washington, DC. Ruth and Malcolm now reside in Port Charlotte, FL.♦

let us hear from you...

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Woese Named to UIUC's First Ikenberry Endowed Chair



Chair at UIUC.

Carl Woese, professor of Microbiology, has been named the first recipient of the Stanley O. Ikenberry Endowed

Chair at UIUC. "I can think of no better way to honor Stanley Ikenberry than by supporting the teaching, research, and service of accomplished scientists such as Carl Woese," Chancellor Michael Aiken said. "The knowledge gained from Dr. Woese's efforts will benefit future generations, just as Stan Ikenberry's years of service to the university will enhance the lives of thousands of

students, faculty, staff, and Illinois residents for many years to come."

This five-year, renewable endowed chair will provide Woese with a salary stipend and support toward his research.

In 1977, Woese, in collaboration with Ralph S. Wolfe, emeritus professor of Microbiology, showed that there are three primary lineages of life, upsetting one of biology's major dogmas that all life was composed of either eukaryotes (animals, plants, fungi, and certain unicellular organisms) or prokaryotes (all remaining microscopic organisms).

This new "third form of life," now called the archaea, are very simple in genetic makeup and tend to exist in "extreme" environments,

niches devoid of oxygen and whose temperatures can be near or above the normal boiling point of water.

The method Woese used to identify the archaea—comparing sequences of a particular molecule central to cellular function, called ribosomal RNA—has become the standard approach used to identify and classify all microorganisms. Woese collaborated on a recently published project that sequenced the first genome (all the genes) of an archaea.

In 1992, he was the 12th recipient of microbiology's highest honor, the Leeuwenhoek Medal, given by the Dutch Royal Academy of Science in recognition of his discovery.♦

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Smart as a Bird???

Alumni Feature: Dr. Russell P. Balda



When was the last time you considered it a compliment to be called a “bird brain?” Perhaps you should if Dr. Russell P. Balda (MS Zoology '63, PhD Ecology '67), Regents' Professor of Biology at Northern Arizona University, calls you one—especially if he compares you with the western Clark's nutcracker.

This bird is the “ultimate memory specialist of the vertebrate world,” Balda says. This “superstar of spatial tasks” will cache, or hide in the ground with no visible external marks, 22,000 to 33,000 pinyon pine seeds in 2,500 sites from August until late November, in a good year. The birds remember where the seeds

are hidden and will retrieve them, which are an important source of nutrition and reproductive energy, from the end of November until June or July.

The nutcracker is well adapted for this seed-collecting and caching lifestyle. It has a sharp, stout bill, enabling it to penetrate the pine cone and extract the seeds. It also has a pouch under its tongue where it can store about 90 seeds during flight. It is a strong flier and can travel approximately 15 miles with a full load of seeds.

“The birds have the morphological equipment to deal with their lifestyle...but do they have the mental

(continued on page 2)

“...It’s all for naught if they don’t remember.” (continued from page 1)

equipment?” Balda asks. “It’s all for naught if they don’t remember.”

Because they can travel fairly long distances, tracking the birds in the field was not practical. So in 1987, the Avian Cognition Laboratory was built at NAU to study this seed-caching behavior in a controlled environment. The birds are observed in a room with a series of holes in the floor. In these holes, Balda and his assistants placed small paper cups filled with sand. The birds hide their seeds into these paper cups. The researchers can cover certain holes with wooden plugs, thereby controlling the number and location of cache sites.

In this lab, Balda set out to determine whether it was memory that allowed the Clark’s nutcracker to find seeds months after they had hidden them, or was there some other explanation. Through a series of experiments, Balda concluded that the birds do have a memory—spatial memory to be specific. “These birds know where they are in space and where their caches are in space.”

Just how long can these birds remember? The bird’s memory doesn’t really begin to decline until after 9 months. “No other vertebrate, including humans, can do what the nutcracker can do,” say Balda. “No one (person) can remember 2,500 places where they put things 9 months after they’ve placed them there.”

But the Clark’s nutcracker is not the only bird that has this seed-caching behavior. Balda has also conducted experiments using the pinyon jay, scrub jay, and Mexican jay. The pinyon jay, like the Clark’s nutcracker, relies heavily on stored food for survival and remembers where the seeds are cached. The scrub jay and the Mexican jay live at lower elevations where the winters are not as harsh and can supplement their diet of cached seeds from their environment; as might be expected, their memory is not as good.

From these comparative studies, Balda concluded that spatial memory is a trait shaped by natural selection. Mental abilities are expensive to a species and will only evolve if needed.

This insight led Balda to consider if different mental capabilities, such as abstract intelligence, might evolve from different natural selection pressures. Abstract intelligence—the ability to categorize, classify, and transfer a rule to other situations—is thought to have evolved among social animals, such as non-human primates. The nutcracker and jays offered Balda

an opportunity to study the evolution of abstract intelligence because they provide both social and solitary models. Pinyon jays are social birds; they select a mate for life and harvest seeds cooperatively. Nutcrackers, on the other hand, are solitary birds.

In a series of bait-and-switch experiments, Balda and colleagues set up eight objects in the laboratory, four of which contained food. As soon as the birds retrieved seeds with 90% accuracy for 10 consecutive trials, the food was moved into four other feeders. The feeders were switched again and yet again. The birds learned progressively faster which group of feeders contained food and which didn’t. “Pretty soon, the birds only had to sample a few feeders to know the food was not in that group of feeders. That’s transferring intelligence.”

And in some recent experiments, Balda has learned that seed-caching birds can use the sun compass (and associated biological clocks) as an aid in locating their hidden caches. This is the first report of a bird using a cue, usually associated with navigation, in an entirely different context, that of foraging.

At the recent annual meeting of the Cooper Ornithological Society, Balda received the Miller Award in recognition of his outstanding life-long achievement in ornithological research. Over the past 35 years, he has been active in a series of studies involving birds, ranging from natural history, conservation, breeding biology, habitat selection, community ecology, population ecology, socio-biology, evolution, behavioral ecology, to cognitive ethology.

While at UIUC, Balda completed his doctoral dissertation under the direction of Dr. S. Charles Kendeigh. In addition to Kendeigh, “I had some wonderful teachers at Illinois, including Hobart Smith, Walter Boch, and George Barlow. They gave me insights into what biology is all about, and how scientific research is conducted.” Balda also takes his role as teacher/scholar seriously, serving on over 100 graduate committees at NAU, and as major professor for 36 MS and 15 PhD students.

Although Balda has not been back to campus in a number of years, he still has ties here. A former PhD student, Jeffrey Brawn, works at the Illinois Natural History Survey and is an affiliate in the department of Ecology, Ethology & Evolution. ♦



Habitat Fragmentation Is Adversely Affecting Migratory Songbird Populations

Habitat fragmentation—the disruption of habitat continuity—has been described as the most serious, long-term threat to biodiversity. Fragmentation reaches its greatest extreme in the Midwest United States. For example, in Illinois 99.9% of the prairie and 80% of the original forests have been converted to row crops and urban/residential areas. The remaining forests and grasslands exist as small, isolated islands in a sea of corn, soybeans, and houses.

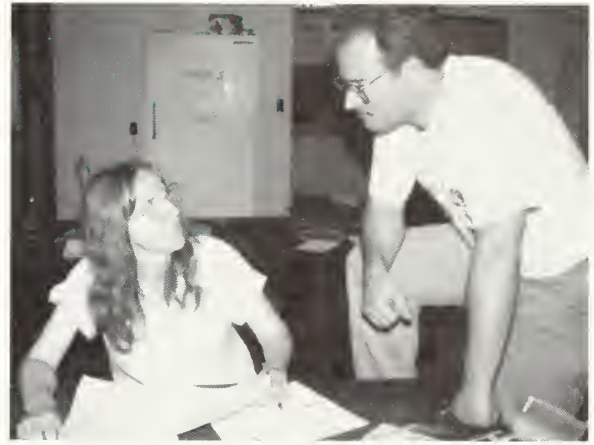
Dr. Scott K. Robinson, professor of Ecology, Ethology & Evolution and professional scientist at the Illinois Natural History Survey, has been using this Midwestern landscape as his laboratory to study the consequences of fragmentation on migratory songbirds populations.

Fragmentation operates on a number of spatial scales, and it is only recently that its effect on the nesting success of migratory birds has been understood. Robinson has found that for many migratory songbirds there is insufficient contiguous forests, and that increasing the habitat “edges” through farming has increased the songbirds’ vulnerability to parasitism and predation.

In fact, the size of the forest may not be as important as the area surrounding the forest. For example, even in large forest tracts surrounded by row crops, songbirds experience a low nesting success, but in smaller forest areas surrounded by hayfields and pastures, nesting success is relatively high.

Robinson explains, “Intensive agricultural landscapes are a paradise for predators, such as raccoons, opossums, foxes, coyotes, and crows, that can feed on waste grain and use adjacent habitats as well. All of these animals are at least occasional nest predators, eating eggs and nestlings of songbirds.” For example, a raccoon nests in trees, eats corn from the fields, and will also raid residential garbage cans. It thrives in the Midwestern fragmented habitat.

Also a major beneficiary of fragmentation is the cowbird. The cowbird used to follow the nomadic bison populations and had a relatively limited range. With the spread of intensive agriculture, the cowbird’s range has also increased. Cowbirds feed in short grass,



Scott K. Robinson working with former graduate student Cheryl Trine.

pasture, and plowed fields and will commute about 7 km from feeding grounds to breeding grounds. All forests in Illinois are within the daily commuting range of cowbirds.

Cowbirds are brood parasites. The female cowbird will lay eggs in the nests of more than 200 host species, and each female will lay between 30 and 40 eggs in a season (compared to 5-20 eggs for most songbird females). The host bird ends up raising cowbirds rather than their own young. Moreover, cowbird nestlings grow quickly and will often crowd out the host’s young.

In Illinois forests, Robinson says, “More than 80% of the nests of wood thrush, scarlet tanagers, veeries, red-eyed vireos, and hooded warblers are parasitized, often with two or more cowbird eggs.” The cowbird can even drive some host species to extinction, and because it parasitizes so many species, that extinction has no real effect on cowbird populations.

With the high levels of parasitism and predation, many migratory songbirds are experiencing a nesting rate success rate that is too low to compensate for adult mortality—these populations are “sinks.” “Most Illinois forest songbird populations are being propped up by immigrants from populations in large, unfragmented forests outside the state, such as the Missouri Ozarks and northern Wisconsin,” says Robinson.

(continued on page 10)

Estrogens and Antiestrogens: Advances in Understanding How They Work in the Cell

Estrogen, tamoxifen, and raloxifene are subjects of the nightly news and the popular press. Both the beneficial and harmful impacts of estrogen, a steroid hormone, on human health are enormous.

Many women in the US use orally active estrogen to avoid conception before menopause or to avoid cardiovascular disease and bone demineralization after menopause. Recently the press also has been reporting on the protective effects of tamoxifen and raloxifene, offering hope to breast cancer patients.

A better understanding of how estrogen works within cells is essential if we are to exploit its positive effects while protecting against its negative effects. Ann Nardulli, assistant professor in Molecular & Integrative Physiology, is investigating the basic mechanisms of how estrogens and antiestrogens interact with DNA to alter gene expression.

How are estrogen-responsive genes turned on? Estrogen brings about its effects by binding to the intracellular estrogen receptor (ER). When bound to the hormone, the ER binds to specific DNA sequences referred to as estrogen response elements (EREs) and modulates gene expression.

EREs are present only in estrogen-regulated genes and are responsible for conferring estrogen-responsiveness to target cells. However, the mechanism by which the ER-ERE interaction alters gene expression is poorly understood. To help define the mechanism, Nardulli's labora-



tory has used a number of biochemical, molecular, and *in vivo* techniques.

When ER and ERE bind, that binding changes the shape, or conformation, of the DNA. Nardulli and her colleagues found that a certain degree of bend in the DNA switches on the estrogen-responsive genes. However, if a mutant ER binds to the ERE, then the angle of the bend may differ and the mutant ER fails to mediate estrogen's effects.

Nardulli has found that binding of ER to DNA not only changes the shape of DNA, but also that slight variations in an ERE sequence can bring about different changes in ER conformation, causing it to bind to different proteins.

"Think of it as two lovers embracing," says Nardulli. "Each changes to conform to the embrace of the other, which helps to explain why all estrogen-responsive genes are not turned on at the same time."

In a recent advance, Nardulli has started looking at an estrogen-responsive gene as it exists in the native chromatin in a living cell.

"There are 3 billion base pairs in every cell nucleus, which is about 6 microns in diameter." By using the *in vivo* footprinting technique, "we can start understanding how estrogens and antiestrogens exert their effects at the level of the gene."

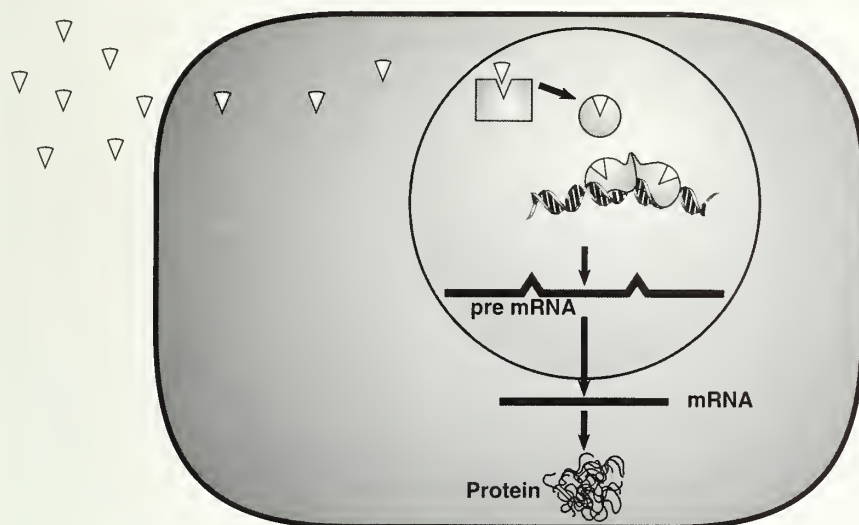
Nardulli has developed model systems to examine the effects of tamoxifen on estrogen responsive

genes in pre- and postmenopausal women to gain a better understanding of how estrogen-responsive genes are regulated in breast cancer cells and in the identification of new targets for clinical intervention.

The antiestrogen tamoxifen binds to the ER, limiting the effects of estrogen. Tamoxifen has been used for several years in the treatment of breast cancer and has been found to be effective in preventing the recurrence of the disease in some women.

Tamoxifen also has cardiovascular and bone density benefits in postmenopausal women, but does seem to increase the risk of uterine cancer. Raloxifene, in recent preliminary studies, seems to have many of the benefits of tamoxifen but without the increased risk for uterine cancer.

For the near future, Nardulli plans to continue studies to determine these basic molecular mechanisms. Who knows, you may be hearing about her advances soon on the evening news. ♦



Estrogen () enters the cell, binds to the estrogen receptor, and induces conformational changes in both the receptor and DNA leading to changes in gene expression.

Researchers Find Estrogen is Vital to Male Fertility

Testosterone may be the hormone that makes the man, but estrogen is vital to male fertility—specifically sperm count—says UIUC researchers actively involved with the Reproductive Biology Research Training Program.

Janice Bahr, professor of Animal Sciences and Molecular & Integrative Physiology, David Bunick, associate professor of Veterinary Biosciences, and Rex Hess, professor of Animal Sciences, found that there is a normal function for estrogen in the male

and that function is required for normal fertility.

"We found that estrogen regulates fluid absorption in the different ductules of the male," Bunick said. This is important because, if the water is not absorbed, the sperm remain dilute and incapable of normal maturation in the epididymus.

The number of genes that express estrogen receptors in the different ductules of rats—when operating normally—is 3.5 times greater than the estrogen receptor message in the female reproductive tract.

When estrogen receptors are knocked out, fluid accumulation in the testes and progressively impaired sperm production because of increased fluid pressure in the testes.

"Estrogen exerts its influence on the male from birth to death," Hess said. "We can now say that this female hormone is intimately involved in regulating fertility in the male, because if you block the estrogen receptor's function, you will have infertility. It is likely that this will be a similar finding in humans." ♦

Continued on Inside Illinois

faculty updates...

Andrew S. Belmont, associate professor of Cell & Structural Biology, in collaboration with Aaron F. Straight, a physiologist in the School of Medicine at the University of California at San Francisco, recently detailed a new non-invasive method for tagging chromosomes which makes genetic activity in living cells easier to see. The method uses a specific protein-DNA interaction in which a protein binds to a target DNA without altering chromosomal structure. "This method is opening a clearer window into the working mechanics in cells. It gives us a way to look at the dynamics that hasn't been possible before," said Belmont.



Ann Marie Craig, assistant professor of Cell & Structural Biology, was awarded a Pew Scholar Award in June 1997. The Pew Scholars Program in

Biomedical Sciences is designed to support young investigators of outstanding promise in basic and clinical sciences relevant to the advancement of human health. Twenty scholars are selected annually and, given evidence of satisfactory progress, are supported for 4 years at \$50,000/year.

William T. Greenough, professor of Psychology, Psychiatry, Cell & Structural Biology, and Neuroscience, has been appointed to the ninth Swanlund Chair, an endowed professorship made possible by a gift from the late Maybelle Leland Swanlund. Greenough, who joined the UI faculty in 1968, has done research on the mechanisms of brain develop-



ment, the neural basis of learning and memory, and the effects of exercise, injury, and environmental enrichment and aging on the brain. In June 1997, he was appointed to a professorship in the Center for Advanced Study, the highest recognition the campus bestows on faculty members. Greenough has also been selected to be director of the Neuroscience Program at UIUC.

Patricia O'Morchoe, professor of Cell & Structural Biology, Nutritional Sciences, and Veterinary Pathobiology, was named Boss of the Year by the Secretariat, an organization of supervisory-level staff employees at the UI. She received the award for performing her duties well while enthusiastically supporting the UI, her consideration of other staff members and students, and her excellent leadership and organizational abilities.

James Slauch, assistant professor of Microbiology, was one of the instructors of *Advanced Bacterial Genetics* at Cold Spring Harbor Laboratory during summer 1997. This course, first taught in 1944, is an intensive exposure to technical and theoretical advances in bacterial genetics and has had a profound influence on all areas of bacterial genetics and molecular biology—most bacterial geneticists have received their initial training in this course or from someone who has taken the course, many important experiments in molecular genetics were conceived during this course, and the most widely used bacterial molecular genetics lab manuals have come from this course. The course has been taught each summer by a distinguished group of bacterial geneticists; Slauch taught with Bonnie Bassler, Princeton



University, and Colin Manoil, University of Washington.

Effective August 1997, **Thomas Anastasio** and **Mark Nelson** were both promoted to associate professors in Molecular & Integrative Physiology and Neuroscience.

At its Nov. 13, 1997, meeting, the Board of Trustees approved the appointment of five new department heads for Life Sciences.

Philip M. Best, was appointed head of Molecular & Integrative Physiology. He is a professor in the department, as well as in Basic Sciences, College of Medicine, and Bioengineering. He earned his doctorate at the University of Washington and has been a professor at UIUC since 1979.

John M. Cheeseman, was appointed head of Plant Biology. He is a professor in the department and an affiliate in Natural Resources & Environmental Sciences. Cheeseman earned his doctorate from Duke University and came to UIUC in 1979.

John E. Cronan, Jr. was appointed head of Microbiology. He is a professor of Microbiology and Biochemistry. Cronan earned his doctorate from the University of California at Irvine and has been at UIUC since 1978.

Arthur L. DeVries was appointed head of Ecology, Ethology & Evolution. He is a professor in the department and in Molecular & Integrative Physiology. He came to UIUC in 1976 and earned his doctorate from Stanford University.

Alan F. Horwitz was reappointed head of Cell & Structural Biology. He was head of the department when it was formed in 1988, and stepped down in 1995. He is a professor in the department, as well as in Biochemistry and Basic Sciences, College of Medicine. Horwitz earned his doctorate from Stanford University.

in memoriam♦♦

Lindsay MacLeod Black died December 23, 1997, at Port Jefferson, NY. He was born in Edinburgh, Scotland, in 1907. He is survived by wife Helen of Ridge, NY, a son, a daughter, and two grandchildren.

He received his BS degree from the University of British Columbia and his PhD from Cornell University.

Black joined UIUC as professor of Botany in 1952 and was in the department until 1973. He was a professor of Genetics & Development from 1973 until his retirement in 1975. His research involved plant virus tumors, insect transmission of plant viruses, evolution of vector and virus, mycoplasmas, and richettsia-like organisms.

Black was editor of *Virology* from 1955 to 1964, and received the Ruth Allen Award from the American Phytopathological Society in 1978. Prior to coming to UIUC, he was curator of the Brooklyn Botanic Garden, New York City.

Ellis G. MacLeod died October 23, 1997. He was born September 3, 1928, in Washington, DC. He served in the Maritime Service and the U.S. Army Air Corps and was a veteran of World War II. He married Morna Kay Whitehurst in 1950 at Rockville, MD. She survives. Also surviving are two daughters, a son, a sister, and seven grandchildren.

MacLeod received a PhD degree in biology from Harvard University. He was an associate professor in Entomology at UIUC. He received the William F. Prokasy Award for Excellence in Undergraduate Teaching in the College of Liberal Arts & Sciences. Through his mastery of teaching and with the depth and breadth of his knowledge he influenced and shaped the minds of many undergraduate and graduate students (as well as faculty and staff).



Gregorio Weber, emeritus professor of Biochemistry and Biophysics & Computational Biology, died July 18, 1997, at Urbana. He was 81.

A native of Argentina, Weber received a medical degree at Buenos Aires University and his doctorate from Cambridge University. In 1962, he joined the UIUC faculty.

Weber pioneered the use of fluorescent spectroscopy in biochemistry. He was the first to apply it to the study of biochemistry and cell function, using it to label proteins, nucleic acids, and other important cell components. Weber received numerous awards honoring his scientific achievements. He retired in 1986. Surviving are three daughters.



retirements♦♦

Lowell Getz, professor of Ecology, Ethology & Evolution, came to UIUC in 1969 as a member of the department of Zoology. He became the longest serving head of EEE, serving from 1976 to 1980 and from 1991 to 1995. For many years he also served as the editor of *The Biologist*. During his tenure at Illinois, he developed an international reputation for his work on the social behavior and population dynamics of small mammals, and he continues to analyze his 25 years of data on the same populations. In 1972, he developed a general education course to teach non-biologists the basic principles of ecology and their application to current environmental problems. This course became one of the most popular, and therefore largest, at UIUC. His many contributions will be missed, though he can still be found now and then in his old office at the Shelford Vivarium.

Arthur Ghent, professor of Ecology, Ethology & Evolution, arrived at UIUC in 1964 and began teaching population biology for honors biology students and biostatistics. Because of his work with insects, he had a joint appointment in Entomology in addition to his regular appointment in Zoology. He joined EEE when the department was formed in 1976; he taught an advanced course in nonparametric statistics in addition to the introductory course. Because his own work concentrated on developing nonparametric statistical tests that could be applied to ecological field data, and because he worked on a wide variety of organisms (insects, mussels, birds, and trees), Ghent soon became the statistical consultant of choice for graduate students. Generations of graduate students remember him fondly as one who was always ready to help and able to rescue them from the grip of some very messy data sets.

Thomas Uzzell, associate professor of Ecology, Ethology & Evolution, came to UIUC in 1985 as director of the Museum of Natural History and as an associate professor in EEE. He already had an international reputation for his research on reproductive systems of reptiles and amphibians when he arrived on campus. While at Illinois, he spent much of his time administering the Museum, but he also developed two courses (quantitative approaches to systematics and herpetology) and pursued collaborative research on the origin of, and the exchange of genetic material among, species of water frogs in Europe. He will be remembered as a spirited participant in discussions of evolutionary questions and as particularly helpful to students learning techniques used in molecular analysis. In his retirement, he remains an active researcher at the Philadelphia Academy of Sciences. ♦

alumni news...

1940s...

Robert Irby Wise, MD, (MS '38, PhD Microbiology '42) is retired and living in Williamsburg Landing, a continuing care retirement community in Williamsburg, VA. During his career he was director, Public Health Laboratories, Texas Department of Public Health, in Wichita Falls and Houston; assistant professor of microbiology at the University of Texas-Galveston; assistant surgeon at USPHS Hospital, New Orleans, LA; assistant professor of medicine and microbiology and director of clinical bacteriology laboratories, University of Minnesota Hospitals, Minneapolis; associate professor of internal medicine, Jefferson Medical College, Philadelphia, PA; and Magee Professor and head of internal medicine, Jefferson Medical College. He also served as a member of the Board of Trustees at Drexel College and Chief of Staff, US Veterans Association Medical Center, Togus, ME. He married Mary Catherine Dosterschill, secretary in the Spanish & Italian Department at UIUC in 1940. Grandsons Erik Wise (electrical engineering) and Joel Wise are students at UIUC.

1950s...

Gerald N. Cohen, MD, (BA Chemistry '50, MS Physiology '54) is in full-time private practice limited to allergy, bronchial asthma, and clinical immunology; he is also an assistant clinical professor of medicine at UIC Medical School. He resides in Evanston, IL.

Wayne H. Davis (MS '55, PhD Zoology '57) is professor emeritus in the School of Biological Sciences, University of Kentucky, Lexington.

Paul F. Doolin, PhD, MD, (MS Zoology '53) is a radiologist at WSUA

Medical Center and the UI Medical Center, Chicago. He practices diagnostic imaging, teaches medical students and radiology residents, and has published 50 research papers. In 1996 Doolin visited hospitals in several cities in China to evaluate their medicine and also presented lectures in China and Hong Kong. He is the former president of the Midwest Society of Electron Microscopy.

1960s...

David S. Boyer, MD, (BS Zoology '68) received the 1996 "Jules Stein Living Tribute" Award as part of the 1996 Vision Awards, saluting pioneering visionaries in Film, Television, Music, and Technology. Vision Awards are presented to an organization or industry whose creative developments have benefitted humankind. Individual awards are presented to "people of vision" associated with the industry being honored.

Edward O. Moll (BS '61, MS Zoology '63) received the Ringenberg Award in 1997, Eastern Illinois University's highest faculty honor. Recipients are selected based on the impact of their achievements on colleagues, students, their profession, the college, the university, and the world as a whole, and on their contributions to collegiality, mentoring, and morale. Eric Bollinger, associate professor of zoology, commented, "Ed's work on the ecology and conservation of river turtles in India and Malaysia may help save some of these species from extinction...(And he has) made all this happen while being a nice, 'regular guy.' He is friendly and easy to like, even if he does root for the Chicago Bears!"



Lance G. Peterson (PhD Entomology '68) was recently named advisor in Research & Development with Dow Elanco. Located in Tallahassee, FL, he

is doing field research with products to fit with integrated pest management systems to control insects, nematodes, and plant diseases in southeast US agriculture.

1970s...

Martha (Hohn) Friedlander (BS Biology '70, MST '72) a biology teacher at Greenhills School, Dexter, MI, completed a month-long institute in neurobiology for high school teachers in 1996. The institute was held at Princeton University as part of the National Leadership Program for Teachers, a program of the Woodrow Wilson National Fellowship Foundation. Supported by the Howard Hughes Medical Institute, the institute was attended by 49 experienced teachers from 28 states and the West Indies. Participants, who were selected through a competitive process, studied neurobiology with scientists and academic researchers and adapted their work for immediate use in the classroom so that their students will have access to the most current research.

Stephen R. Ortman (BS Biology '74) has been a senior buyer for Motorola, Inc. for 8 years. He also volunteers at the Spring Valley Nature Sanctuary of the Schaumburg, IL, Park District.

1980s...

Ava V. Ackerman, DVM, (BS Biology '89) is an associate veterinarian in a small animal/exotics clinic in

Belmont, CA. **Mitchell J. LaBuda, Jr.**, PhD, (BS Chemistry '90) is a process engineer at Crystal Technology, Inc., a division of Siemens, Palo Alto. They reside in Los Altos, CA.

Narda J. Coronado, DDS, (BS Biology '85) recently bought her own practice in Aurora, IL and is practicing general dentistry.

Cynthia L. Elliott, MD, (BS Biology & Psychology '80) is an emergency physician in Tampa, FL, and a member of the National Disaster Medical Assistance Team. She spends her free time kayaking the Gulf of Mexico. She was elected a Fellow of the American College of Emergency Physicians in 1990.

Melody A. Evilsizer, DVM, (BS Biology '87, BS Animal Science '89) is an associate veterinarian in a mixed practice in Wallisville, on the Texas Gulf Coast.



Yasemin Ozcan (BS Biology '85, MD '89) and **Allan Ruby** (MD '90) are in Frankfort, IL. Allan is in ob/gyn practice in Frankfort

and continues to play violin with the University of Chicago Symphony. Yasemin is in a flexible physical medicine and rehabilitation practice in Palos Heights; she stays busy with Nathan (7), Joel (3), and baby #3 that was expected June 1997.

Pradip D. Patel, MD, (BS Microbiology '88) is an assistant professor of pediatrics at the University of Louisville School of Medicine.

For the third year in a row, students at University Laboratory High School have claimed one of 12 high school-level regional prizes in the Toshiba/National Science Teachers Association ExploraVision Awards program.

Students were advised by University High biology teacher **David Stone** (MS Entomology '84). This program is the world's largest science competition for students in grades K-12. Their project was chosen from nearly 5,000 team entries.

1990s♦♦♦

Arthur Cheng, MD, (BS Biology '93) is a pediatric resident at the Christ Hospital/UI program in Oak Lawn, IL. He hopes to practice as a medical missionary.

Jeffrey Connolly (BS Biology '94) is an associate biochemist working on validating fluorescence polarization (FPIA) and micropeptide enzyme immunoassays (MEIH) for the Therapeutic Drug Monitoring Business Teams at Abbott Laboratories. He and Beth Cools were married in July 1997.

Kurt A. Foote (BS Ecology, Ethology & Evolution '90) is working as a biological science technician for the National Park Service at Grand Canyon National Park. The work primarily involves habitat restoration of degraded sites in the park.

Christine Gebhardt (BS Biology '92) received a DO degree in 1996 from Pacific University; she is working in two private practices in Oregon as an optometrist. In her spare time, she enjoys snow skiing and exploring the Pacific Northwest.

Thomas R. Gillespie (BS Ecology, Ethology & Evolution '96) collected data on the ecology of several poorly known primate species in the Peruvian Amazon from May through August 1997. In August he started graduate work with the Department of Zoology at the University of Florida, supported by a CLAS Fellowship (their most prestigious fellowship). As Colin Chapman's student, he will join the

team working on the long-term study of community ecology and conservation at the Kibale Forest, Uganda.

Nick Jazayeri (BS Biology '96) is in dental school in Gainesville, FL.

Banita B. (Sehgal) Kooner (BS Biology '93) earned her MPH in epidemiology at UIC in 1994 and is attending the College of Osteopathic Medicine, Western University of Health Science in California. She plans to graduate in May 1999 with her DO degree. She was married in 1996 and resides in Pomona, CA.

Steven Kuhn (BS Biology '92) graduated from UIC College of Dentistry in May 1997. He is a dental resident at Loyola University Hospital in Maywood, IL. He recently married Kathy Mason (BS Education '92).

Jennifer E. Mehren (BS Entomology '96) won a Churchill Scholarship for a year of study at Cambridge University, Cambridge, England. She will pursue a MS in genetics while attending Churchill College. Churchill Scholarships enable outstanding US students to do graduate work in engineering, mathematics, and sciences for 1 year at Churchill College. In addition to paying for tuition and fees, the scholarships provide living and traveling expenses. About 10 scholarships are awarded each year. After completing her studies at Cambridge, she plans to return to the US to work on a PhD in neuroscience.

Thomas E. Numrych, MD, (MS '87, PhD Microbiology '92) completed a residency in pediatrics and joined a group health cooperative as a pediatrician in Woodinville, WA.

Melinda (Sneep) Wilson, PhD, (BS Microbiology '92) is a postdoctoral research fellow at the University of Kentucky, Lexington, working on the neuroendocrinology of aging.

(continued on page 11)

“Most Illinois forest songbird populations are being propped up by immigrants...”

(continued from page 3)

This knowledge is revamping conservation strategies. Increased efforts are being directed at preserving the large forest tracts, most of which contain extensive public land holdings. Also, some preliminary results indicate that cowbird parasitism may not be as great a problem in grasslands, and the effectiveness of prairie restoration is being studied as a conservation strategy.

“Through the mid-90’s, we had not found a forest area in Illinois that was a net exporter of songbirds. But recently in the eastern Shawnee National Forest in southern Illinois we have found some pockets of high nesting success.” The agricultural land in this area is in pastures and hayfields, not row crops, so Robinson and his colleagues will be studying what makes these tracts special over the next several years.

But why do songbirds accept cowbird eggs in the

first place? Some bird species will eject the cowbird eggs from their nests, while other species may abandon a cowbird-parasitized nest. If those evolutionary strategies are available, why don’t songbirds employ them?

“Most migratory songbirds have been produced in large forest tracts and have immigrated into the fragmented forests of Illinois. They have not experienced cowbird parasitism and have not evolved a defense,” says Robinson. But with the recent spread of the cowbirds, selective pressure is being newly applied, and Robinson and his colleagues will be looking for the development of defensive strategies.

The regional studies conducted by Robinson are very people intensive. One field crew may be composed of 20-30 individuals, many of which are undergraduate and graduate students at the University of Illinois. ♦

1998 Undergraduate Awards

SOLS ALL-SCHOOL DISTINCTION—*Jason M. Casolari, Biology*

SOLS DIRECTOR’S AWARD—*Julianna T. Ross, Microbiology*

HARRIETT LONG AWARD—*Michael V. Dutka, Molecular & Integrative Physiology*

HELEN E. HESS AWARD—*Daniel J. Chrobak, Biology*

DR. M.L. ZELLERS SCHOLARSHIP FOR PRE-DENTAL STUDENTS—*Chad R. Sears, Biology*

MILDRED PARIZEK ZUKOR OUTSTANDING ACHIEVEMENT AWARD—*Susan L. Kalis, Microbiology*

DEPARTMENT OF CELL & STRUCTURAL BIOLOGY ACADEMIC EXCELLENCE AWARD—*Brooke N. Bandy, Mary T. Peter, Daniel M. Schreiber*

DEPARTMENT OF ENTOMOLOGY ACADEMIC EXCELLENCE AWARD—*Jodie A. Ellis*

CLARK MICROBIOLOGY OUTSTANDING ACADEMIC & RESEARCH ACHIEVEMENT AWARD—*Julianna T. Ross, Microbiology*

CLARK MICROBIOLOGY OUTSTANDING RESEARCH ACHIEVEMENT AWARD—*Susan L. Kalis, Microbiology*

CLARK MICROBIOLOGY BEST ACADEMIC RECORD AWARD—*Byrd T. Miller IV, Microbiology*

C. LADD PROSSER OUTSTANDING ACHIEVEMENT AWARD—*Bimal Vyas, Molecular & Integrative Physiology*

HOWARD S. DUOFF PRIZE FOR THE BEST SENIOR THESIS—*Michael V. Dutka, Molecular & Integrative Physiology*

1998 Graduate Student Awards

ROBERT EMERSON MEMORIAL GRANT—*Ellen S. Green, Entomology*

HARLEY J. VANCLEAVE FELLOWSHIP—*Julie Beckstead, Plant Biology*

HERBERT HOLDSWORTH ROSS MEMORIAL FUND AWARD—*Colin R. Favret, Entomology; Tricia M. Hardway, Plant Biology*

CLARK SUMMER GRANT—*Teodar G. Paunescu, Biophysics & Computational Biology; Hanna E. Stevens, Neuroscience*

CLARK RESEARCH SUPPORT GRANT—*Anne Michele Arntz, Plant Biology; Yehuda Ben-Shahar, Entomology; Christina M. Caruso, Ecology, Ethology & Evolution; Andrew B. Harris, Biophysics & Computational Biology; Nathan G. Hatcher, Molecular & Integrative Physiology; Sheila A. Lyons, Plant Biology; Katarina S. Midelfort, Biophysics & Computational Biology; Karin S. Pfennig, Ecology, Ethology & Evolution; Edward D. Plowey, Molecular & Integrative Physiology; Lorene E. Romine, Biology*

JOHN G. & EVELYN HARTMAN HEILIGENSTEIN AWARD FOR EXCELLENCE IN TEACHING OF BIOLOGY—*Niles S. Warren, Biophysics & Computational Biology*

OUTSTANDING TEACHING ASSISTANT IN BIOLOGY 120—*Colin R. Favret, Entomology*

OUTSTANDING TEACHING ASSISTANT IN BIOLOGY 121—*Joseph R. Pomeroy, Plant Biology*

OUTSTANDING TEACHING ASSISTANT IN BIOLOGY 122—*Christina M. Lankaitis, Cell & Structural Biology*

DUPONT AWARD FOR OUTSTANDING TEACHING BY A GRADUATE STUDENT IN THE DEPARTMENT OF ENTOMOLOGY—*Matthew D. Ginzel*

AWARD FOR OUTSTANDING TEACHING IN MICROBIOLOGY—*Donald J. Weaver, Jr.*

AWARD FOR OUTSTANDING TEACHING IN PLANT BIOLOGY—*Sheila A. Lyons, Joseph R. Pomeroy*

JOHN R. LAUGHAN AWARD—*Roberto Barreiro, Plant Biology; Matej Lexa, Plant Biology*

JAMES E. HEATH AWARD FOR EXCELLENCE IN TEACHING IN PHYSIOLOGY—*Thomas J. Anastasio*

(continued from page 9)

in memoriam♦♦

Patricia R. Due, retired secretary from Molecular & Integrative Physiology, died June 28, 1997, at her Champaign home. She retired from the department in July 1994, but continued working part-time there until December 1996. She served in the Women's Army Corps during the Korean War.

Zana G. Skidmore (MS '33) died on December 24, 1996, in Wichita, KS. She received her BS degree from Ottawa College, Ottawa, KS, in 1924 and taught high school at Tyro, KS. After completing her MS degree at UIUC, she worked as a lab technician at St. Johns Hospital in Tulsa, OK, as a field researcher for the Oklahoma Public Health Department, and as an assistant professor of bacteriology at Oklahoma State University, Stillwater. She also taught laboratory technicians at Joliet Hospital, Joliet, IL, and at the School of Nursing, Burnham Hospital, Champaign, IL.

An-Sern Angela (Liu) Wong (MS Plant Biology '80) died December 4, 1996, following a 5-year battle with thymoma (cancer of the thymus gland). ♦

The Chemical & Life Sciences Laboratory was honored with two awards at the Capital Development Board's 25th anniversary awards ceremony. A certificate of recognition for Art-In-Architecture honor's the buildings five sculptures in the three-dimensional medium category. The sculptors are Roger Blakely and Peter Fagan, UI professors of art, and Dann Nardi, Stephen Luecking, and Barry Tinsley. The CDB also awarded the Thomas H. Madigan Award for New Construction to the various project teams involved in the building, including team members from many campus units. Projects are judged on aesthetic and technical features, complexity and programmatic achievement, estimate and bidding success, design and construction schedule, design-related change orders, architect/engineer and contractor performance ratings, and project teamwork. ♦

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Current Activity/Employment _____

How Cells Move

Anna Huttenlocher, professor of Pediatrics in the College of Medicine and affiliate in Cell & Structural Biology, Alan F. Horwitz, professor of Cell & Structural Biology, and colleagues have made strides in understanding the mechanisms of cell migration.

“Learning about the basic mechanisms of how cells move may have implications for a wide range of diseases, including inflammatory problems such as arthritis and asthma as well as cancer invasion and metastasis,” says Huttenlocher.

UI researchers have been looking at the relationship of integrin receptors, which are protein molecules that link the outside and inside of

cells, with cell movement. Integrin receptors play a pivotal role in cell adhesion. A cell moves when the front protrudes and sticks to something else. The rest of the cell follows as it contracts and slinks forward—if the tail decides to go along.

In recently published articles, these researchers described how calpain, an inhibitor of a calcium-dependent protease (an enzyme), altered cell movement. They found that the inhibitors tightened adhesion properties in hamster ovarian cells and thwarted the tail’s ability to let go.

Depending on the type of integrins present on the surface of cells, cells can either move apart easily or become stuck to each other. Under

time-lapse videomicroscopy, the researchers could see how cell movement totally shut down when a specific receptor was expressed.

“One of the ways in which this is important is when you think of tumor cell biology,” Huttenlocher explained. “A tumor should not be able to invade and metastasize if the individual cells can’t move away from each other.”

In addition to gaining the ability to stop cell migration, understanding the basic mechanisms could be used, for example, to make desirable cells get into wounds to promote healing. ♦

—*Courtesy of Inside Illinois*
Jim Barlow, Life Sciences contributor

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LIFE SCIENCES

alumni newsletter

fall 1999

Enhancing the Experience...Shaping the Future

Through the School of Life Sciences Enhancement Fund, we were able to attend an important workshop on "Importation Biological Control in the Midwest" in July. This workshop was held at the US Department of Agriculture European Biological Control Laboratory in Montpellier, France.



Workshop participants



John Tooker looking for the pine needle scale bug.

Coordinated by the Midwest Institute for Biological Control, we met and discussed the pest management tactic called importation biological control with experts from the USDA, France, and Australia.

Through a mixture of classes, field trips, and group projects we focused on how to find and safely import natural enemies to control important Midwestern insect and weed pests. Since we both hope to have careers in biological control-related fields, this workshop was invaluable to us.

Thank you for this experience and for supporting the School of Life Sciences Enhancement Fund with your gifts.

—Marianne Alleyne and John Tooker
graduate students in Entomology



Parasitic wasp laying eggs inside caterpillar pest. After 2 weeks parasite progeny will emerge and the caterpillar will die. These types of natural enemies are being studied by John Tooker and Marianne Alleyne as possible biological control agents for various Midwest pests.

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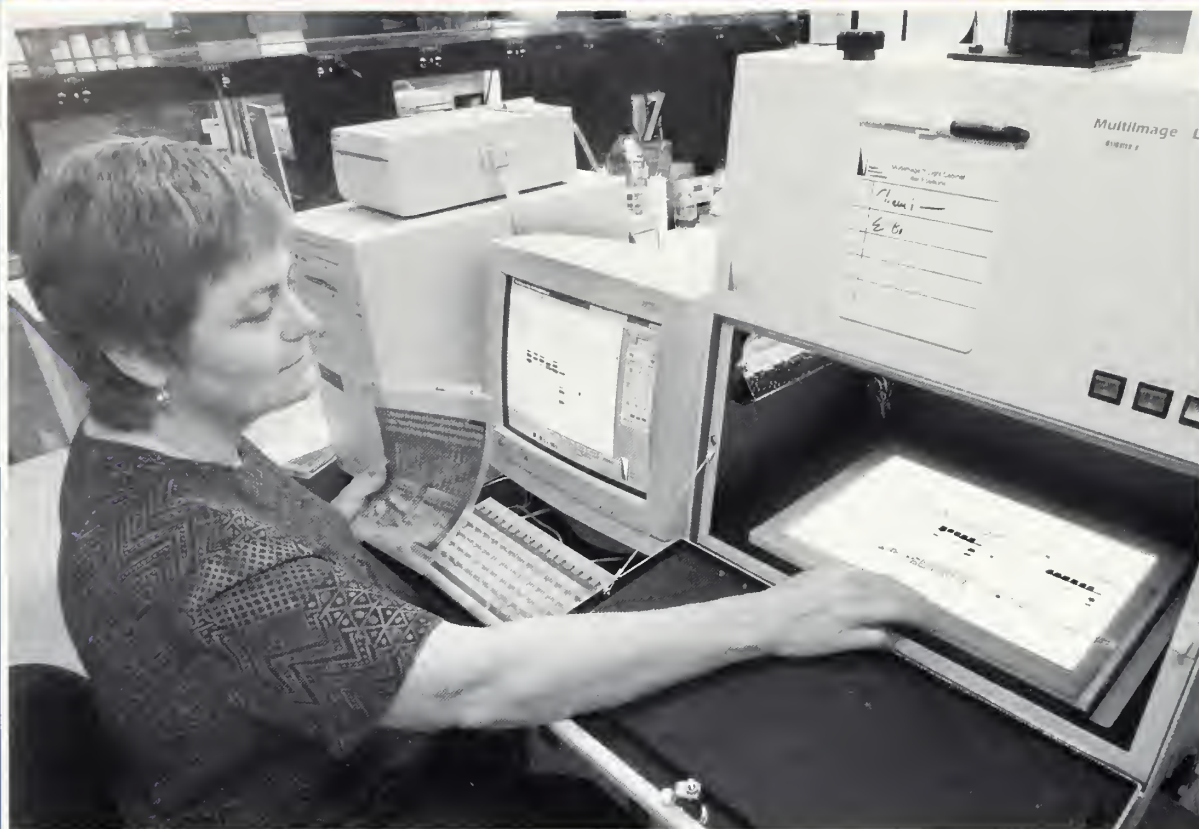
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LIFE SCIENCES

alumni newsletter

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*Alumna Dr.
Eleanor Blakely*

New Approaches to Understanding the Biological Effects of Radiation

Since the late 1800s when Marie Curie began studying radioactivity, and Pierre Curie deliberately exposed his forearm to radium to document its biological effects, the study and use of radiation has been an important area of scientific investigation. Exposure to radiation can produce deleterious effects on humans, including causing cancers, while therapeutic use of radiation can cure some cancers. How do

we delineate the critical parameters affecting the response of normal and tumor tissue? How do we determine effective doses? Does densely ionizing radiation induce persistent genomic instability?

These are some of the basic questions that **Dr. Eleanor Blakely** (PhD Physiology & Biophysics '75) has been addressing in her work as a senior staff biophysicist at Lawrence Berkeley National

Laboratory, University of California-Berkeley.

"I became interested in radiation biology while working on my bachelor's degree at the University of San Diego. Although I had originally intended to become a high school biology teacher, some of my professors steered me toward medicine. But I discovered my real interest was in finding out how the body works—understanding

the fundamental mechanisms," says Blakely.

She spent the summer of her sophomore year as an intern at Oak Ridge National Laboratory. That was it. Her career choice was set. After receiving her BA, she was awarded a US Atomic Energy Commission fellowship that she could take to any of a large number of universities in the country to pursue an advanced degree.

After looking at several schools, she decided to come to Illinois and work with Dr. Howard Ducoff, an internationally recognized expert in the field of radiation biology. "I enjoyed my experience at the University and in the Midwest. Howard opened so many doors for me in my career." In 1974 she was named the Robert Emerson Outstanding Graduate Student.

Her brother William also came to Illinois for his PhD under Ducoff's tutelage. He is now a molecular radiation biologist at the US Armed Forces Radiobiology Research Institute in Bethesda, MD.

After receiving her PhD in 1975, Blakely started her career at Lawrence Berkeley National Laboratory, working on the basic radiobiology of ionizing radiations with

variable ionization density. She has also been involved in clinical applications and follow-up of particle-beam radiotherapy.

Over the last several years, Blakely and her research team have been studying cataractogenesis. Particle radiations, including both proton and helium-ion beams, have been used successfully to treat uveal melanoma. "If these eye tumors are irradiated through the lens of the eye, a cure rate of 97% is achieved." However, the treatment often induces formation of cataracts.

"We found that if the whole lens was irradiated, individuals developed cataracts within 2.5 years. But if only part of the lens was irradiated, it took much longer for cataracts to develop." Understanding the mechanisms underlying this radiation-induced late tissue end-point became her goal.

To address this question, Blakely and her associates have been studying Fibroblast Growth Factor (FGF)-2, a cytokine protein involved in epithelial cell migration, proliferation, and differentiation. FGF-2 plays a diverse role in various tissues of the eye. Gradients of concentrations of FGF-2 are thought to be responsible for estab-

lishing cell migration patterns within the lens.

Also, FGF-2 is required for differentiation of epithelial cells in fiber cells. The mechanisms underlying radiation-induced cataract are thought to involve direct DNA damage to the epithelial cells, which is later expressed as opacification when the epithelial cells have differentiated and migrated—in other words, forming a cataract.

To test these hypotheses, Blakely needed human lens epithelial cells to irradiate and monitor. "These cells didn't grow well in a petri dish. I received permission to use bovine corneal endothelial cells to provide a protein-rich extracellular matrix on which to grow the human cells. Embedded in these protein layers are cytokines, including FGF-2."

In an article recently submitted for publication, Blakely and her associates report the novel findings of transient and cyclical induction of 8-fold higher levels of transcription of FGF-2 in human lens epithelial cells in response to a single acute dose of radiation. Within 30 minutes of treatment, they found increased transcription and increased FGF-2 protein appearing in the

*continued
on p. 4*

irradiated cells. Another wave of transcription occurred at 3 hours post-irradiation, followed by a wave of increased protein levels 6 hours after exposure.

FGF-2 is known to down-regulate apoptosis, or programmed cell death. If the apoptotic mechanism to purge damaged cells from the lens is down-regulated, or suppressed, by these increased levels of FGF-2, then the damaged cells may survive. Their subsequent migration and differentiation into lens fiber cells could be flawed, leading to cataract formation.

thesis may take up plasma low-density lipoprotein (LDL), the main cholesterol carrier in blood. It has been suggested that LDL might serve as a selective vehicle to deliver therapeutic compounds into actively dividing tumor cells available due to a tumor-induced compromise in the blood-brain barrier, without harming normal brain cells.

Blakely and her laboratory have been investigating the selective uptake of such a compound—boronated protoporphyrin, called BOPP—as a potential treatment protocol. “Understanding the mechanism of

stratify these lines by the number of LDL receptors present and the degree of LDL binding. Their data suggest that LDL receptor numbers are up-regulated in glioblastoma cells, but there is considerable variation in binding affinity.

“An excellent question posed to us was ‘What are the number of LDL receptors on normal brain cells?’ When I tried to obtain ‘normal’ brain cells for this study, the Tumor Bank explained that they don’t get any donors in this category!”

Blakely arranged to obtain para-normal human frontal brain tissues that were to be discarded from surgery on an epileptic patient. But what was required to grow “normal” brain cells *in vitro*? “To our amazement, supplementation with FGF-2 was recommended.”

She is actively continuing these research areas and is also collaborating on the role of FGF-2 in the radiation response of the murine mammary gland and the lung.

This type of scientific research requires “a team approach. The days of a single investigator at a bench top are largely a thing of the past for research programs

LDL might serve as a selective vehicle to deliver therapeutic compounds into actively dividing tumor cells...

Blakely has also worked on glioblastoma multiforme, a devastating brain tumor. These tumors are characterized by uncontrolled, aggressive cell proliferation and infiltrative growth within the brain; they are also generally resistant to conventional treatment.

Increased cell proliferation and growth is associated with a high turnover of cell cholesterol for membrane growth. Cells requiring cholesterol for membrane syn-

BOPP uptake and retention will be important in attempts to modify toxicity and efficacy of this drug, and to the design of new drugs.”

They obtained seven human glioblastoma cell lines, all of which were histologically categorized as grade IV (most severe) cancers. Although the same histologically, these cell lines didn’t behave the same.

Blakely and her associates found that they were able to



The Striking Cover Photographs

Normal human lens epithelial (HLE) cells grown on extracellular matrix and stained in exponential and confluent growth are featured on the cover of this issue of the Alumni Newsletter. The cells' nuclei are stained with DAPI (blue), and the actin is stained with TRITC-phalloidin (red). On the front cover are exponentially growing HLE cells, which are large and cuboidal. On the back are confluent differentiating HLE cells. These cells are elongating and the actin fibers show parallel alignment. Photographs courtesy of Dr. Eleanor Blakely and the Lawrence Berkeley National Laboratory.

involving this kind of multi-disciplinary science." Many experiments conducted by Blakely and her colleagues are 40 hours long and must be monitored at all times. "Thank goodness I have an excellent staff and a very understanding husband."

"Science is very competitive today. You must be able to compete for research dollars and publish results. If I could make one recommendation of a required course for all students who plan to go into research, it would be on how to write grants. Fine science in and of itself may not get funded. It's how you put it all together."

And Dr. Blakely is putting it all together. Madame Curie would be proud. ■

Blakely is married to George Zizka (pictured above), who works in the Engineering Division at Lawrence Berkeley National Laboratory, and they have an 11-year-old daughter. They reside in Oakland, CA. Photographs courtesy of Lawrence Berkeley National Laboratory.

New Program in Ecology & Evolutionary Biology Approved

Increased awareness of the severity of environmental issues continues to strengthen the demand by public and private sectors for students with advanced training in ecology.

To meet this need, the UI Graduate College recently approved the program in Ecology & Evolutionary Biology, which initially will be offered as a "specialization" in the biology doctorate program. The program will begin admitting graduate students for fall 2000.

Recognizing the strength and tradition in ecology and evolution at UIUC, this program is designed to reach across administrative boundaries and provide a cohesive platform for graduate

training in ecology and evolution.

The program in Ecology & Evolutionary Biology focuses on giving graduate students a thorough understanding of ecological and evolutionary processes at the individual, population, community, and ecosystem levels of organization, as well as in such contemporary issues as global change and conservation biology. Students also will gain a high degree of proficiency in modern analytical and quantitative methods.

More than 40 faculty from 6 departments and 3 colleges contribute to the program. Evan DeLucia, associate professor of Plant Biology, is the program director. ■



The Beetle That Ate Chicago

A new movie for the Annual Insect Fear Film Festival? Unfortunately, not. The Asian longhorned beetle (*Anoplophora glabripennis*) is a very real threat.

This 1.25-inch long, coal black beetle with irregular white spots on its back and 2-inch long antennae with white rings has invaded the United States, including Chicago, and it has a taste for our hardwood trees.

"I had heard about the Asian longhorned beetle when it was discovered in New York in 1996," says **Larry Hanks**, assistant professor of Entomology. "I was interested in learning more about it since I was studying a related species native to Australia. The Eucalyptus longhorned borer (*Phoracantha semipunctata*) has killed millions of eucalyptus trees in California since it was introduced in the 1980s."

"I thought that within 10 years we might find the Asian longhorned beetle in Chicago, and then I would have a chance to work on it." But last summer they were found in Ravenswood and several other areas in Chicago. "I think the beetles may actually have been in the Chicago area for at least 6 years. Although this is a flashy looking beetle, it is very hard to see in a tree, and probably went undetected."

This beetle is a serious pest in its native China where it kills hardwood trees. "We are fairly certain that the Asian longhorned beetle came to the United States in wooden shipping pallets from China." And this beetle has a big appetite.

"The Asian longhorned beetle prefers maple species—including Norway, red, silver, sugar, and boxelder—but it also attacks elm, black locust, green ash, mulberry,

horse chestnut, poplars, and willows, or more than 60% of our street trees."

"Ironically, these tree species were planted to replace the elms killed by Dutch elm disease." This new pest may have equally catastrophic effects.

Although quarantines have been established and efforts are directed at trying to minimize the beetle's spread, "it will be very difficult. The latitudes in China for its normal range correspond with the area from the Great Lakes to Cancun, Mexico."

Eradication of this pest is extremely unlikely. There are no natural predators. The larvae tunnel under the bark and into the wood, perhaps 6 inches under the surface, so topical insecticides are not effective. Systemic insecticides, even if effective, would be cost prohibitive. "It is a very pernicious pest."

Of the 35,000 species in this large family of beetles, many species seem to attack only stressed trees. WPWR Channel 50 Foundation in Chicago has awarded Hanks a grant to determine if the Asian longhorned beetle also uses stressed trees as hosts.

"If stress is required for infestation, then the Asian longhorned beetle probably won't be a forest pest and it may not affect the maple syrup and tourist industries of the Northeast. Also, homeowners might be able to help prevent infestation in valuable trees by proper pruning, fertilization, *etc.*"

To measure tree stress, Hanks and his students use a pressure bomb, a stainless steel chamber with a locking lid. They insert a leaf in the chamber with the petiole sticking through an opening in the lid. Then they apply pressure to the chamber until water comes out of the petiole, which is directly related to the water tension in the leaf. The higher the

pressure, the more stressed the tree. After these baseline studies are conducted, Hanks and his associates will monitor patterns of infestation to determine whether the beetle prefers stressed trees—a process that will take years.

Hanks is interested in how adult behavior is influenced by its larval host requirements. Some beetle species feed on dying and dead trees. The nutritional quality of the host disintegrates quickly and there is intense competition for resources. "We have found that the adults of such species are active fliers, quickly moving from tree to tree; adults feed for a short time, mate for very short periods, and lay eggs quickly."

The Asian longhorned beetle requires a living host. "As adults they will feed on the leaves, mate for hours, and may never leave their natal (or birth) tree. The adults are very lethargic. If you knock one out of the tree, it will just walk back and climb up the tree."

Multiple generations may be found in one tree, and it may take 5-6 years to kill a host, depending on the level of infestation. Understanding the beetles' behavior may help in suggesting future control strategies.

The introduction of the Asian longhorned beetle into the US is a consequence of improved trade relations with China.

"Global commerce provides many opportunities for stow-away pests, and the problem will only get worse. There is a longhorned beetle in Japan that attacks pine trees. Imagine if it invades the States."

"These exotics are like the AIDS epidemic, and global shipping is like unprotected sex," says Hanks. "The only good thing is job security—at least for entomologists." ■



Larry
Hanks

**The Illinois Department of
Agriculture hotline to report
sightings of this beetle:
1-800-641-3934**

Hanks earned a BS in entomology from the University of California, Davis, in 1978, an MS in biology from the University of Nevada, Reno, in 1982, and a PhD in entomology from the University of Maryland, College Park, in 1991. He held a postdoctoral position at the University of California, Riverside, and then became an assistant research entomologist there. Hanks came to the University of Illinois in 1996.



Photo by James E. Appleby



Howard Hughes Medical Institute Awards \$1.6 Million to UI Life Sciences

A comprehensive UIUC program geared for undergraduate students in the life sciences and fostering community outreach has received a \$1.6 million grant from the Howard Hughes Medical Institute (HHMI).

This grant is part of \$91.1 million in 4-year grants awarded by HHMI to 58 universities in 32 states, the District of Columbia, and Puerto Rico. The awardees were selected from 191 proposals made by 205 institutions. This is the third HHMI grant awarded to the UIUC.

"I am very excited and thankful to the Howard Hughes Medical Institute for its confidence and support of our on-going program," said Susan Fahrbach, entomologist, neuroscientist, and new director of the UI Hughes Program. "We have an exciting set of programs that have had a broad impact on our campus, our community, the state of Illinois, and the nation."

A major component of the Hughes program is the Under-

graduate Research Fellows, which allows freshmen and sophomores to conduct hands-on research in faculty labs. These students are selected from UI life sciences majors and from colleges and institutions where minorities are underrepresented in the life sciences. Since 1993, 311 students have participated in the program, and 130 faculty from 19 units have served as advisors and mentors.

The Hughes Program in Life Sciences also supports:

- The specially designed Calc and ChemPrime summer programs for incoming freshmen. CalcPrime uses a computer-based, highly visual approach to calculus that lets students whose placement scores were below requirements for Math 120 learn at their own pace and see the relevance of mathematics to life sciences. ChemPrime prepares students for introductory chemistry classes.

- The Footlocker Program provides high school science

teachers with training, new ideas, workshops, and teaching kits in biotechnology.

- The Prairie Flowers Program provides middle school science teachers throughout central Illinois, primarily in rural areas, with teaching kits, training, and computer networking opportunities to encourage girls and minority students to explore science careers.

- BOAST (Bouchet Outreach Achievement in Science and Technology) is designed to boost the scientific interest of primary and secondary schoolchildren by linking UI engineering and science students with academically at-risk students at Champaign's Kenwood Elementary School.

For additional information about the program, visit www.life.uiuc.edu/hughes/ ■

HHMI is a medical research organization whose principal purpose is the pursuit of biomedical research. For more information, see www.hhmi.org/home/.



Susan Fahrbach



Percy Morales: Hughes Program—A Window of Opportunity

For the last 3 years, I have benefited from the Hughes Program for Undergraduate Education in Life Sciences. In 1996 I entered the BioCalc pre-freshman summer program, because I had not placed into calculus. However, because of the program, I was able to enroll in calculus in the fall, along with my peers. BioCalc prevented me from falling behind early in my college education.

Also during the 3-week BioCalc program, I met many of the 1996 Hughes Undergraduate Research Fellows, and visited some of their labs. These research labs were so different from the usual classroom labs—I also wanted to be a Hughes Undergraduate Fellow.

I was accepted into the program in the summer of 1997. Since I had just completed my freshman year, the idea of participating in basic research was intimidating. These fears were soon

pushed aside, as I was blessed with an excellent laboratory environment. I learned a great deal about my field by the end of the summer. What an experience! I met so many interesting people and learned a lot from the various workshops. It changed the way I viewed research.

After benefiting so much, I wanted to give back to the program. I applied to be a summer advisor in 1998. Advisors bring the Hughes Undergraduate Fellows together to interact, set up activities and workshops, and create a positive environment for the program. Serving as a summer advisor made me realize the amount of work required to keep the program going, and how much the staff of the Hughes Program puts into it.

In addition, serving as an advisor was my first experience as a student leader, a position that continued throughout the school year as I served as the co-chair of the Hughes Student Advisory Board.

It amazes me how much the Hughes Program has been a part of my life. It gave me

the opportunity to prove myself as a student and researcher. Through my research I have received many awards, scholarships, and internships, including a Barry M. Goldwater Scholarship.

In addition, my leadership roles in the program have allowed me to mature both as a student and as a person. I have developed real friendships with fellow Hughes participants.

I intend to pursue an MD/PhD in infectious diseases. Three years ago I would have never considered getting a PhD degree. Participating in this program has changed my career goals.

Lastly, I'd like to thank the Hughes Program for sending me the BioCalc application in 1996, and giving me the opportunity to prove myself. Sometimes you can't realize your full potential without a window of opportunity. ■

Morales (BS Biology '00) received one of 304 Goldwater Scholarships awarded nationally for the 1999-2000 academic year. He is majoring in cell and structural biology, with a minor in chemistry. Goldwater Scholarships are designed to encourage outstanding students to pursue careers in mathematics, natural sciences, and engineering.



The Incredible Shrinking Iguana

Honey, I Shrunk the Iguana! More precisely, the global climatic event called El Nino shrunk the marine iguanas. As **Martin Wikelski**, assistant professor of Ecology, Ethology & Evolution, explains, "The recent prolonged El Nino seems to be responsible for significant changes in both body weight and length in the marine iguanas of the Galapagos Islands."

Wikelski has been traveling to the Galapagos Islands for 12 years to study the Galapagos marine iguanas (*Amblyrhynchus cristatus*). "The iguanas are very useful as a model system to study the evolution of body size. We particularly target the mechanisms of natural selection and sexual selection that underlie evolutionary changes in body size."

El Nino is a periodic climatic phenomenon characterized by abnormally warm water in the surface layer of the southern Pacific Ocean. Also, atmospheric changes occur that produce changes in wind direction and velocity, altering the areas where tropical rains fall. The El Nino of 1997 and 1998 may have been the biggest such event in 150 years and had far-reaching effects on the flora and fauna of the Galapagos.

In the El Nino of 1982 and 1983, marine iguanas suffered conspicuous mortality (45-70%, depending on location), caused by absence of food, increased incidence of illness, reproductive failure, and displacement to other locations.

Marine iguanas are the only lizards that feed in the sea,

grazing on beds of algae in the intertidal zone and even diving for submerged seaweed. The colonies, some with as many as 4,000 individuals per mile, are mainly found on the southern, wave-exposed coastlines of the islands, where algae are nourished by cold, upwelling currents. But during an El Nino event, the warm waters cause a shift in the species of marine algae to species that the marine iguana cannot digest.

Wikelski and co-workers discovered that some marine iguanas in their study colonies not only lost over half their body weight during the El Nino, but also lost up to 25% of their body length. How is this possible?

They hypothesize that the long, slow deterioration of



Martin
Wikelski

the food supply induced stress. They found very high levels of corticosteroids in blood

samples drawn from the iguanas; these levels likely promoted bone and tissue resorption.

By shrinking, the iguanas appear to have increased

for 1.5 million fractures annually, making it a major public health problem. In 1987, the estimated national direct expenditures (hospitals and nursing homes) and indirect expenditures (lost earnings) for osteoporosis and associated fractures was \$10 billion (\$27 million each day)—and the cost is rising. Also, astronauts are known to lose bone density and have bone shrinkage during extended space flights.

How can iguanas shrink and regrow? How might such

This ability to re-add bone mass may eventually have implications for humans.

their chances of survival. However, this adaptive mechanism does not come without a cost. Because the animal becomes much smaller, reproduction is adversely affected.

Wikelski adds, "But that's not the end of the story. Once conditions improve and food supplies are restored, the iguanas start growing again." This ability to re-add bone mass may eventually have implications for humans.

Today 25 million Americans are affected by osteoporosis. Osteoporosis is responsible

knowledge lead to medical efforts to prevent or remedy osteoporosis in humans? Such topics are likely to keep Wikelski and co-workers busy for years to come. ■

Wikelski came to the University of Illinois in 1998. He received his MS degree from the University of Munich (Germany) in biology and zoology and his PhD from the University of Bielefeld in zoology and behavioral ecology. He was a postdoctoral associate at the University of Washington, Seattle, and at the Smithsonian Tropical Research Institute, Panama. Want to know more? Explore his web site at www.life.uiuc.edu/wikelski/

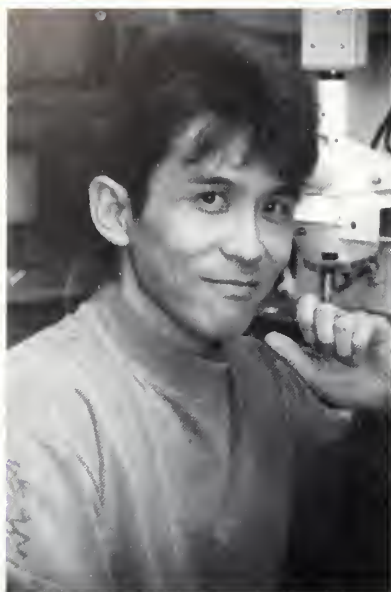
Scientific American Frontiers Voyage to the Galapagos

Scientific American Frontiers shares the magic of the Galapagos Islands with everyone in *Voyage to the Galapagos*, premiering October 5, 1999, on PBS. In this first science special of the 1999-2000 season of Frontiers, host Alan Alda and a bevy of scientists explore the islands in five exciting segments.

The marine iguana population was devastated by the 1997-98 El Nino event. Find out more about these unusual creatures from Martin Wikelski, an expert on marine iguanes in "Lizards of the Sea."

For more information about this series, visit www.pbs.org/saf/ ■





Akira
Chiba

Binding Proteins Play Role in Early Brain Development

central nervous system is widely recognized. However, its necessity in the early stages of brain development had only been theorized and studied in test tubes—with interesting but mixed results—until now.

A UI study using embryos of live *Drosophila*, a fly with similar but less complex brain structures than those of vertebrates, indicates that without key integrin subunits, axons misfire and route randomly. The fly's guidance system is without an interpreter.

were still lacking integrin,” said Akira Chiba, assistant professor of Cell & Structural Biology and Neuroscience, and affiliate of the Beckman Institute for Advanced Science and Technology.

The research which involved the use of immunocytochemistry—the study of cells using immunologic methods such as fluorescent antibodies—was funded by the National Institutes of Health and the National Science Foundation.

Chiba and Bao Hoang, a doctoral student in Cell & Structural Biology, focused on individual linking units, or neurons, and the genetic activity that tells the early developing neuron process, known as the axon, where to go.

“Our lab is interested in the genetic programs for brain development, especially making the connection from what is encoded to DNA to the brain's emergence,” Chiba said.

“The axon is capable of communicating with the outside world. It can collect

The internet depends on a firm foundation of wiring. When it's not done correctly, data get lost in a maze of circuitry.

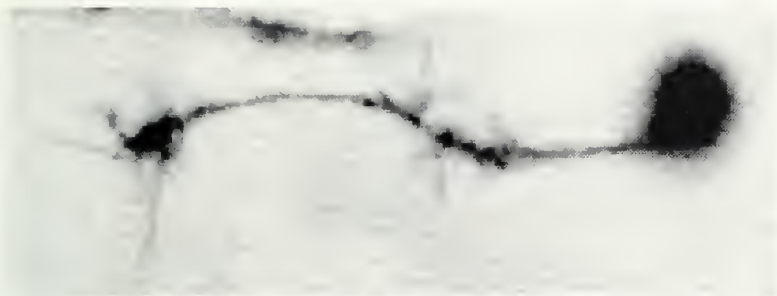
The same is true of the brain. When it is develop-

ing, wiring is crucial, and without integrin, the brain's networking will run amok.

It has long been accepted that integrin is a must-have family of binding proteins for cell adhesion, migration, and wound healing, and its presence in the brain and

“When we put normal integrin proteins back into the brains of developing knockout flies [those genetically engineered without integrin], then the nervous system, almost like wildfire, was rescued and developed normally, despite the fact that other tissues down the line

“Our lab is interested in the genetic programs for brain development, especially making the connection from what is encoded to DNA to the brain's emergence.”



Direct visualization of a developing neuron (nerve cell) inside the nervous system of a fruitfly embryo. This neuron was genetically engineered to express fluorescent protein (which appears dark in this inverted photograph). The technique allows us to monitor how the simple neural network is established and also how integrins and other key molecular players influence its normal course of events. Photograph courtesy of Mike Kim, Chiba lab.

information about its micro-environment. But the axon also has to interpret its cue and correctly activate certain molecular interpreters that will lead to local molecular reorganization, especially the cytoskeletal system. Every movement of the axon re-quires reorganization of the cytoskeleton.”

In essence, it appears that specific molecules of integrin are vital to the initial wiring of the brain. “The axon will continue to grow

without integrin, but it fails to interpret the cues that tell it when to stop or turn in a certain direction. It grows without direction.”

“A lot of scientists have identified specific guidance cues of cells, which act much like traffic signals. We propose that integrin is one of the most, if not the most, key molecules that neurons use for interpreting traffic signals that guide them in their initial development.” ■

Chiba earned a BA in biology from Union College, Lincoln, NB, in 1983, an MS in biology from Andrews University, Berrien Springs, MI, in 1986, and a PhD in biological sciences/ neuroscience from State University of New York-Albany in 1990. He was a postdoctoral fellow at both Yale University and the University of Tokyo, Japan. Chiba came to the University of Illinois in 1994. Story courtesy of Jim Barlow, Inside Illinois.

1999 Undergraduate Student Awards

SOLS All-School Distinction: Shelby

L. Feinberg, Biology Honors

SOLS Director's Award: Amanda D.

Popp, Biology

Harriett Long Award: Chad R. Sears,

Biology

Helen E. Hess Award: Ross M.

Fasano, Biology

Dr. M.L. Zellers Scholarship for Pre-

Dental Students: Miranda Wassef,

Biology

Mildred Parizek Zukor Outstanding

Achievement Award: Joseph A.

Beatty, Molecular & Integrative

Physiology

Department of Cell & Structural

Biology Academic Excellence Award:

Dawn S. Stecher

Ecology, Ethology & Evolution Out-

standing Undergraduate Student

Award: Jarrett R. Johnson

Clark Microbiology Outstanding Best

Academic Record Award: George E.

Schmitz

Molecular & Integrative Physiology

Highest GPA, Junior: Karen J.

Engberg & Tracey A. Janik

Molecular & Integrative Physiology

Highest GPA, Senior: Prashant K.

Sura

C. Ladd Prosser Outstanding Achieve-

ment Award: Joseph A. Beatty,

Molecular & Integrative Physiology

Howard S. Ducoff Prize for the Best

Senior Thesis: Amir Y. Mirarefi,

Molecular & Integrative Physiology

New Insight into Long-Distance Nutrient Transport in Plants

In humans, the heart is the mechanical pump that circulates the blood of life. In plants it's sucrose accumulation that energizes the heart's equivalent—an osmotically driven pressure-gradient—in a vascular system that regulates and directs where life-giving resources go.

At the heart of the findings is an improved understanding of how plants regulate the distribution of organic nutrients synthesized during photosynthesis, according to **Daniel R. Bush**, associate professor of plant biology and scientist with the Photosynthesis Research Unit of the US Department of Agriculture-Agricultural Research Service.

"We could have diagrammed the mechanics of how the plant's vascular system works 10 years ago, but we didn't have a biochemical and molecular understanding of the proteins that mediate the key steps," said Bush.

Bush and his laboratory previously provided new insight

into this system when they used a biochemical assay to describe a proton-sucrose transporter in plant cells that is a key player in energizing long-distance nutrient transport.

In agricultural crops and most other plants, leaves function as the primary supplier of free energy and organic nutrients. "Leaves—the 'source' tissue—contain the photosynthetic machinery that transforms light energy into useful biological energy. Leaves export much of that energy, in the form of sucrose and amino acids, to satisfy the nutritional needs of nonphotosynthetic cells."

The nonphotosynthetic "sink" tissues specialize in other essential processes, such as mineral acquisition (roots) or reproduction (flowers, seeds, and fruit). These sink tissues represent the majority of tissues harvested by farmers. "Not surprisingly, their impact on resource allocation in the plant is substantial. For example, as much as 80% of



Daniel Bush (l) and graduate student Matt Vaughn (r) set up an experiment to test the impact of sucrose-signaling on resource allocation.

the atmospheric carbon dioxide assimilated during photosynthesis goes toward satisfying the nutritional needs of the sink tissues." The evolution of these specialized tissues systems generated a need for transport mechanisms that mediate organic nutrient flow among the various organs of the plant. "This resource distribution process is known as assimilate partitioning and it plays a major role in plant growth and crop productivity."

Current models of assimilate partitioning suggest that several sucrose and amino acid transporters make key contributions to resource

allocation within cells and between plant organs. These transport proteins are differentiated by function, transport properties, expression patterns, and membrane location.

When sucrose departs from leaves, it is loaded into the elongated phloem cells of the vascular tissue by a powerful transporter, which boosts sucrose concentrations 50 to 100 times higher than it is in all surrounding cells. This high concentration of sucrose inside the phloem draws water into the cells. "As water moves in, positive hydrostatic pressure builds, forcing the concen-

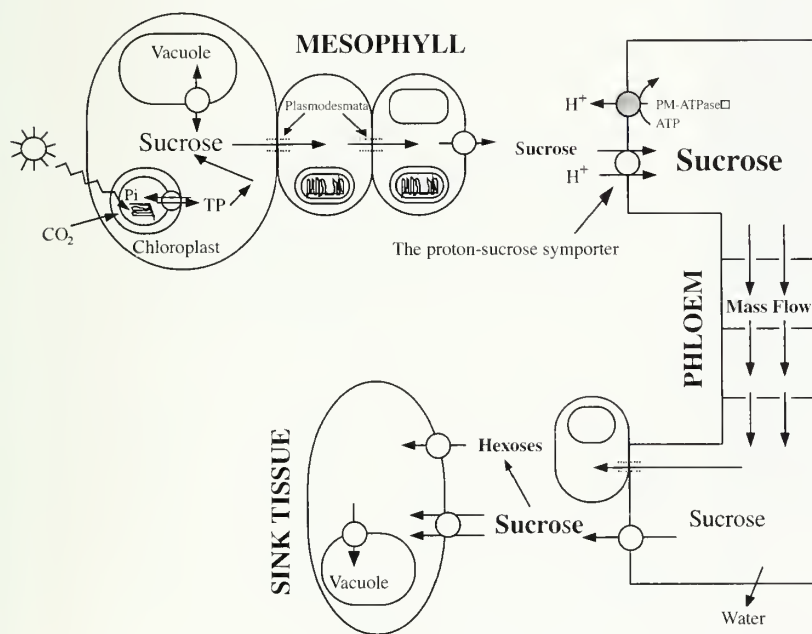
trated sucrose solution through the phloem cells to the sink tissues."

Bush and his laboratory recently provided the first evidence for a regulatory system that controls phloem loading. They discovered that sucrose itself acts as an information molecule for a response pathway that regulates the activity of the sucrose transporter. This is a significant discovery because it provides a mechanism for balancing production in the leaf with the metabolic needs on nonphotosynthetic organs. If utilization drops, phloem loading decreases, and sucrose builds up in the

leaf which leads to decreased rates of photosynthesis.

"This was the first clue to how a system can regulate resource allocation," said Bush. "The vascular tissue, I think, is going to turn out to be a very dynamic tissue in a plant, because it's here where cells move organic material around, not unlike the human vascular system. Moreover, it is not only a pathway for materials, but also for information."

"My suspicion is that there are other control pathways that are coordinating with this system to communicate information about water status or nitrogen availability. Ultimately, these results may allow us to develop novel strategies to improve productivity and enhance the nutritional value of agricultural crops." ■



Diagrammatic representation of a generic plant illustrating the central role of the proton-sucrose symporter in phloem loading and long-distance transport.

Bush received a BA in life sciences from California State University, Humboldt, in 1978 and a PhD in physiological and molecular plant biology from the University of California-Berkeley in 1984. He has been at University of Illinois since 1988. Bush also is director of the interdepartmental program in Physiological and Molecular Plant Biology. Based on a story by Jim Barlow, Inside Illinois.

Creating *Living* Legacies...

The generous gifts of the following highlighted individuals enable Life Sciences at the University of Illinois to maintain excellence in its research and teaching programs. An endowed gift allows the department or program to preserve a financial gift for all time by holding it in perpetuity, investing the principal, and using only the income from that investment to financially support and honor the selected faculty or students. It is a gift that enables the donor to create living legacies that span generations.



Dr. David R. Lincicome and Dr. Margaret S. Lincicome recently established the Harley Jones VanCleave Professorship in Life Sciences through a bequest. This professorship honors Dr. VanCleave, distinguished service professor of zoology at the University of Illinois from 1911 to 1953 and a leader in the field of parasitology.

As a tutorial student under the direction of VanCleave, David completed his BS and MS degrees in zoology in 1937 from UIUC. He earned a PhD in tropical medicine from Tulane University School of Medicine, New Orleans, in 1941. Peg earned her BA at

Randolph-Macon Woman's College, Lynchburg, VA, in 1931, her MA at Columbia University, New York, in 1935, and her PhD from the University of Virginia in 1938. David and Peg were both involved with teaching and research in parasitology and tropical medicine, David as a graduate research professor mentoring more than 25 masters and doctoral students and Peg as a Naval Medical Officer at the Naval Medical Research Institute; both have received numerous awards and honors. David founded and was long-time chair of the Editorial Board of *Experimental Parasitology* and also founded the international scientific journals of *Virology*, *International Review of Tropical Medicine*, and *Advances in Veterinary Sciences*. Since their retirement they have been active in the conservation of rare domestic animal breeds and have been long-time breeders of Jacob sheep, Tunis sheep, Pygmy goats, Nubian goats, and soft-coated wheaten terriers.



“We are doing what we believe in, it gives a purpose and reason for living,” said Roy and Eva Hong when they established the Roy and Eva Hong Research Fund in Molecular Biology. **Eva Hong** has added a bequest to that fund which will endow a professorship in this important area of the life sciences.

Roy was born in Canton, China in 1914 and came to Danville, IL, in 1923. He received his BS in 1937 from UIUC and went to the University of Illinois School of Medicine in Chicago and received his MD in 1942. While serving an internship at Cook County Hospital, he met Eva. They moved to Wild Rose, WI, where he practiced medicine. Roy died in 1996 and Eva now resides in San Diego, CA.

Dr. Chester W. and Nadine C. Houston have established an endowed fund that will in part provide merit-based scholarships to undergraduate students in biology and microbiology. “We both came from working families and obtaining an education was very important to us. That’s why we are interested in seeing other students have those same opportunities.”

Chet received all of his degrees from UIUC—his BS (1939) in science & letters, and his MS (1940) and PhD (1947) in microbiology. Nadine earned an AB from the University of Kansas and then received a BS in library science in 1943 and an MS in 1946 in microbiology from UIUC. Chet retired as a professor of microbiology from the University of Rhode Island; his research specialty was in food and industrial bacteriology. Nadine worked as a professional librarian, including serving as reference librarian at Abbott Laboratories and retired as coordinator of instructional media for the South Kingston (RI) School District. They now reside in Urbana, IL.



faculty updates

Andrew Belmont, professor of Cell & Structural Biology, and **Hugh M. Robertson**, professor of Entomology, were named University Scholars in 1998. Both were promoted to full professor in 1999.

Since joining the faculty, Belmont developed a system for viewing specific segments of DNA inside living cells. His analysis of chromosome structure is changing textbook models.

Robertson was elected a fellow of the American Association for the Advancement of Science in 1999. His laboratory leads the world in efforts to characterize mobile elements of DNA for the purpose of developing tools to genetically manipulate insect pests. He is also studying the molecular basis of insect olfaction.

John Cronan, professor and head of Microbiology, was elected a fellow in the American Academy of Microbiology.

William T. Greenough, professor of Psychology and Cell & Structural Biology, and director, Neuroscience Program, and his research group received the National Fragile X Foundation's William Rosen Award for outstanding research in the fragile X mental retardation field. The award was presented in July 1998.

In a recent *Nature* article, **Feng Sheng Hu**, assistant professor of Plant Biology, establishes for the first time a highly resolved climate history for the past 10,000

years, and demonstrates unprecedented changes in post-glacial climate that are tightly linked to ecosystem processes. Hu joined UIUC in 1998.

Benita S. Katzenellenbogen, professor of Molecular & Integrative Physiology, Cell & Structural Biology, and Medicine, received the 1998 Jill Rose Award from the Breast Cancer Research Foundation for contributions to her field. She is an internationally recognized expert on hormones and breast cancer. An elected fellow of the American Academy of Arts & Sciences, Katzenellenbogen is also president-elect of The Endocrine Society.

World-renowned experts in magnetic resonance imaging took part in a symposium "Zeugmatography and Beyond" honoring **Paul C. Lauterbur** on his 70th birthday. Lauterbur is professor of Molecular & Integrative Physiology, head of Medical Information Sciences, and director of the Biomedical Magnetic Resonance Laboratory. He and wife **M. Joan Dawson**, associate professor of Molecular & Integrative Physiology, were among the presentors.

Stephen Long, from the University of Essex, UK, was named the Robert Emerson professor in Plant Biology and Crop Sciences at UIUC in 1998. His research is directed at understanding mechanisms of plant responses to rising atmospheric carbon dioxide concentration and tropospheric ozone, with particular reference to photosynthesis.

Stanley Maloy, professor of Microbiology, was a visiting professor at Pontificia Universidad Catolica de Chile, Santiago, Chile, in 1998.

Ken Paige, associate professor of Ecology, Ethology & Evolution, and **Jeff Brawn**, Illinois Natural History Survey, recently published an article in *Science* on conservation of the greater prairie chicken in Illinois, which links loss of fitness to genetic diversity in a wild population.

Tom L. Phillips, professor of Plant Biology and Geology, was elected as a member of the National Academy of Sciences in 1999. Membership in the Academy is one of the highest honors that can be accorded a US scientist or engineer.

Scott K. Robinson was promoted from associate to full professor in Ecology, Ethology & Evolution in 1998. He is also serving as department head.

Andrew H.-J. Wang, professor of Biophysics, Biochemistry, and Cell & Structural Biology, was named a fellow of the American Association for the Advancement of Science in January 1999.

Ralph S. Wolfe, professor emeritus of Microbiology, has been selected to receive the 1999 Procter & Gamble Award in Applied and Environmental Microbiology. Wolfe is being honored for his groundbreaking work on methanogenesis. ■

faculty retirements

Govindjee, professor of Biophysics & Computational Biology and Plant Biology, retired in July 1999. He earned a BS in chemistry, botany, and zoology in 1952 and an MS in botany from University of Allahabad, Allahabad, India. He earned his PhD in 1960 in biophysics at UIUC under the tutelage of Robert Emerson, Eugene Rabinowitch, and Jan Thomas, and was the last graduate student of Emerson. After a year as a postdoctoral fellow, Govindjee joined the faculty at UIUC in 1961 in botany and biophysics.

Govindjee has taught a variety of undergraduate and graduate level classes, from basic biology to plant physiology to the bioenergetics of photosynthesis. He was ranked as an excellent teacher by both undergraduate and graduate students.

Govindjee's research has been studying the molecular mechanisms and regulation of electron transport in chloroplasts from water to pyridine nucleotides. His research on photosynthesis has led to more than 360 publications and numerous honors, including several Fulbright lectureships, fellow of the American Association for the Advancement of Science, fellow and life member of the National Academy of Science (India), and fellow of the Japanese Society for Promotion of Science.

On Oct. 14, a special photosynthesis symposium, sponsored by the Integrated Photosynthesis Research Group, the Center for Biophysics & Computational Biophysics, and Plant Biology, was held in his honor.

Malcolm L. Sargent, associate professor of Plant Biology retired in August 1999 after 31 years at UIUC. Sargent received his BS in chemistry from the University of Michigan in 1960, and his PhD in biology from Stanford University in 1966. Sargent came to UIUC in 1968 and has, over the years, been in the departments of Botany (now Plant Biology) and Genetics & Development.

Sargent has taught a variety of biology courses, including introductory biology, genetics, biological clocks, biology of bryophytes (mosses, liverworts, and hornworts), environmental botany, and field botany. Sargent's research initially was concerned with the molecular biology of circadian rhythms and characterization of fungus-like particles in *Neurospora* and more recently with the molecular phylogeny and reproductive physiology of bryophytes.

Sargent plans to stay in Champaign-Urbana and play with his grandchildren. He will also find time to teach environmental botany and to develop and publish aids for identifying North American bryophytes and Illinois vascular plants.

Edward W. Voss, Jr., professor of Microbiology, retired in Dec. 1998 after being a faculty member at UIUC for 32 years. Voss received his BS in biology and chemistry from Cornell College in 1955, and his MS and PhD in microbiology from Indiana University in 1964 and 1966, respectively. Voss came to UIUC in 1967. In addition to his faculty appointment in Microbiology, Voss was a member of the Biotechnology Center and served as director of its Cell Science Center from 1988 to 1994.

Voss has concentrated his research efforts in two specific areas—antibody structure-function studies using the chemically defined and spectrally sensitive fluorescein haptenic determinant, and immunochemistry and immunogenetics of murine derived autoimmune anti-DNA antibodies characteristic of the systemic lupus erythematosus (SLE) autoimmune syndrome. His research has led to the development of a number of molecular probes and immunoassays.

Voss has received numerous honors including the Fleur-de-Lis Award (1986) and induction into the Hall of Fame (1988) of The American Lupus Society, named Jubilee Professor in the College of Liberal Arts & Sciences (1990) and James R. Martin University Scholar (1994), UIUC; Panhellenic Council Outstanding Faculty Award (1994), and the E.I. DuPont Educational Award (1994). ■



Govindjee



Malcolm L. Sargent



Edward W. Voss, Jr.



William
Horsfall

William R. Horsfall, professor emeritus of Entomology, died Nov. 18, 1998. He is survived by his wife of 68 years, Annie Laurie Ellis Horsfall.

Horsfall, born Jan. 11, 1908, received a BS in biology from the University of Arkansas in 1928, an MS in agriculture from Kansas State University in 1929, and a PhD in entomology in 1933 from Cornell University. He taught at Cornell and held faculty positions at the University of Arkansas-Fayetteville and South Dakota State University-Brookings, where he was also head of biology. During World War II, he served in the Pacific Theatre as commander of the US Army's 17th Malarial Unit. Horsfall remained active in the Army Reserves until 1965.

In 1947 he joined Entomology at UIUC as assistant professor of medical entomology, and retired as professor in 1976. Horsfall developed and taught a variety of courses on insect bionomics, insect control, and medical entomology. His research was centered on mosquitoes, mosquito-borne diseases, and their control. In the process, he mentored 21 doctoral and 20 masters students in medical entomology. Over his career, Horsfall published 5 books and more than 140 scientific papers and bulletins, and received numerous awards.

Robert Lee Metcalf died Nov. 11, 1998, 2 days before his

82nd birthday. For over 50 years, he worked toward implementing intelligent, rational, and environmentally sustainable pest control; and for many of those years, he was an articulate and courageous spokesperson for a viewpoint that was distinctly unpopular.

Metcalf, whose father Clell was a professor in Entomology at UIUC, received his BS in 1939 and MS in 1940 from UIUC, and his PhD from Cornell University in 1942.

In 1943 Metcalf was an assistant entomologist for the Tennessee Valley Authority, where he developed new approaches to chemical control of mosquitoes in impounded waters. After 6 years there, he joined the faculty at University of California-Riverside. While at Riverside he developed carbamate insecticides.

Metcalf began his professional career just as synthetic organic insecticides first came into widespread use and were widely heralded as the ultimate insect control agents. He was among the first to document resistance and cross-resistance to pesticides, and developed a laboratory bioassay to estimate the LD50, or the dose lethal to 50% of a test population, that became the standard in the field.

In 1968, Metcalf came to UIUC. From 1969 to 1972 he served as head of zoology; in 1971, he was named distinguished professor of Biology. During this period, Metcalf pioneered the model ecosys-

tem. He and coworkers evaluated over 200 chemicals in this terrestrial-aquatic ecosystem.

In 1975, Metcalf highlighted the use of attractants and repellents that manipulate insect behavior rather than destroy physiological function. Until a few weeks before he died, Metcalf continued to refine his technique, to minimize further synthetic organic inputs; cucurbitacin baits combined with neem products, as opposed to pesticides, were field-tested in summer 1998.

Over his career, Metcalf authored or co-authored over 450 scientific papers, several books, and advised over 80 graduate students. He received many honors for his accomplishments. He was a member of the National Academy of Sciences and a fellow of the American Academy of Arts & Sciences and of the American Association for the Advancement of Science. In 1997, the University of Illinois awarded him the honorary degree of doctor of science.

Metcalf married Esther Rutherford on June 22, 1940, at Urbana. She died May 13, 1991. He married Elaine West Reynolds on Jan. 1, 1992, at Albuquerque, NM. She survives. Also surviving are 3 children, 4 step-children, a brother, and 4 grandchildren. Memorial contributions may be made to the University Foundation-Robert L. Metcalf Fund, Harker Hall, 1305 W. Green St., Urbana, IL 61801. ■



Robert
Metcalf

1940s

Jane Claire Dirks-Edmunds (PhD Zoology '41), emerita professor of biology, Linfield College, McMinnville, OR, recently published *Not Just Trees: The Legacy of a Douglas-fir Forest* (Washington State University Press). Covering a span of more than 60 years, the book is about the amazing variety of life in an ancient Oregon Coast Range forest.

1950s

Julius S. Greenstein (MS '51, PhD Zoology '55) retired as dean/director, Ohio State University in 1994 after 14 years. He is also president emeritus of Central Ohio Technical College. He was chair of the biology departments at Duquesne University and the State University of New York, Fredonia, and acting dean at SUNY. He was dean at Shippensburg (PA) University before coming to Ohio. In 1994-95 Greenstein was a distinguished visiting professor at the US Air Force Academy, and has remained a professor of biology at Ohio State. He and wife Joette (Mason, '54) have been married for 45 years and have 5 children and 4 grandchildren. He welcomes e-mail at greenstein.1@osu.edu.

Robert M. Robinson, DDS, (MS Physiology '52) retired from his family dentistry practice. He enjoys barbershop singing, family, traveling, and golf. He resides in Cincinnati, OH.

1960s

Elizabeth Juergensmeyer (PhD Biology '67), professor of biology, Judson College, Elgin, IL, and her daughter, Margaret Juergensmeyer, have been collaborating on the effects of microgravity on bacteria and how astronauts would respond to antibiotics in space. They have found that bacteria grown in space can spontaneously change their resistance to antibiotics. One of their experiments spent 3 months on space station Mir.

Michael Morgan (MS '65, PhD Plant Biology '68), professor of natural & applied sciences, University of Wisconsin-Green Bay, received the Herbert Fish Johnson Professorship in Environmental Studies. His research focuses on rare plant species and he is director of their herbarium.

1970s

Richard R. Almon (BS '68, MS '70, PhD Physiology '71) is professor of biological sciences and pharmaceuticals at the State University of New York at Buffalo.

Donald G. Buth (BS '71, AB '72, MS '74, PhD Ecology, Ethology & Evolution '78) is a professor of biology at the University of California at Los Angeles. He teaches ichthyology, field biology of marine fishes, systematics, parasitology, and vertebrate biology.

Mark Eldred, DDS, (BS Biology '79) is senior dental surgeon, US Public Health

Service, Florence, CO. He is working on his MPH and soloed a sail plane en route to licensing; he is also a power pilot. Eldred is involved in the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) activities. He remembers "my time at UIUC with some pain, but mostly good times."

L. Scott Ellis (MS '76, PhD Biology '79), professor of biology, was named head of the Division of Science, Truman State University, Kirksville, MO. He had previously served as biology coordinator of the Science Division.

Martin J. Gorbien, MD, FACP (BS Biology '77) has been named associate professor of internal medicine and director of programs in geriatric medicine, Rush Medical College, Chicago. He previously directed fellowship training in geriatric medicine at the Cleveland Clinic Foundation and at the University of Chicago Pritzker School of Medicine. Gorbien is vice-chair of the Clinical Practice Committee of the American Geriatrics Society. He served as director of Volunteer Illini Projects' Senior Citizens Program from 1975-77.

Carlos A. Neyra Estens (PhD Biology '74), associate professor of plant biology, Rutgers University, New Brunswick, NJ, was awarded three patents in 1997 for microbial technologies to promote plant growth and a reduction of the

quantity of chemical inputs in agriculture. In 1997, he also received the Medal of Honor from the government of Peru.

Jerome T. Pacocha (BS Biology '76) is president and owner of ET3, Inc., founded in 1986 as a full-service hazardous waste consulting firm, specializing in small-quantity chemical disposal, training, and brokering.

1980s

John A. Dellinger (BS '76, MS Biology '82, PhD Veterinary Biosciences '84) is director of the Illinois Poison Center. The Center provides poison prevention and control services to the general public and hospitals through its toll-free number, 1-800-942-5969. IPC has its roots in the oldest poison center in the country, and is now the largest single poison center, handling nearly 200 cases per day.

Russell A. Kesman, DDS, (BS Biology '83) recently received the Fellowship Award from the Academy of General Dentistry. He lives in LaGrange Park, IL.

Christine Jeon Lee, DDS (BS Biology '89) finished her pediatric dental residency at UIC in 1995, and was a pediatric dental fellow at Children's Memorial Hospital and Northwestern University in 1996. Lee is in private practice in Gurnee and Waukegan, IL. She and husband John Sangkeun Lee had son Brian in February 1998.

Martin B. Stein (BS Ecology, Ethology & Evolution '83) is an environmental scientist for the Alabama Department of Environmental Management, and resides in Birmingham. He earned his MS in 1987 from Texas Tech University.

Frances Jean Wildman (BS Ecology, Ethology & Evolution '80) earned an MBA degree in 1998 from the University of Iowa. She is the hazardous waste program manager at the Rock Island Arsenal, Rock Island, IL.

1990s

Juan Bouzat (PhD Ecology, Ethology & Evolution '98) accepted an assistant professorship at Bowling Green State University.

Juan J. Jimenez, MD, (BS Biology '92) is a resident physician in otorhinolaryngology (head and neck surgery) at the University of Oklahoma Health Sciences Center. He received his MD degree from UIC (Rockford) in 1996.

Khizer Husain (BS Biology '98) was awarded a Fulbright grant with which he will pursue a master's degree at the London School of Hygiene & Tropical Medicine. He plans to return to the US for medical school and a career in international health.

Diana Kazlaukas (BS Biology Honors '98) was one of 20 college students selected for *USA Today's* 1998 All-USA College Academic First Team.

She was chosen from a pool of 1,194 students on the basis of outstanding intellectual achievement and leadership. Volunteering in her family's homeland in Vilnius, Lithuania, she established the first "candy-striper" hospital volunteer program there. She is now in medical school.

Linda S. Kim (BS Biology '91) received her OD degree from Illinois College of Optometry in 1996 and taught optometry at Danish College of Optometry from 1996 to 1998. She is pursuing a PhD in vision sciences at Astor University, Birmingham, England.

David Lanzotti (BS Biochemistry & Bioengineering '95) started a doctoral program in genetics and molecular biology at the University of North Carolina-Chapel Hill in 1997.

William D. Robinson (PhD Ecology, Ethology & Evolution '98) is an assistant professor at Auburn University.

Elizabeth McMurry Russo (BS Biology '92) received an MS degree in molecular microbiology and immunology in 1998 from the University of Southern California. She was recently named biology instructor and Biotechnology Certificate Program, College of the Canyons, Valencia, CA. She and husband Tim, also a UI graduate, live in Altadena, CA.

Anne (Gretel) Ryan, MD, (BS Biology and German '92) is an orthopedic surgery resi-

dent at Ohio State University Hospital, Columbus. She received her MD degree from Michigan State University in 1996.

Erik John Strods (BS Biology '94) served as an agroforestry volunteer in the Peace Corps from 1995 through 1998 in Cameroon, West Africa. "It is the toughest job you'll ever love!"

in memory

Kelly K. McDermott-Barrett, DDS, (BS Biology '77) died Oct. 14, 1998, after running in the Chicago marathon. An avid runner, she was running in her second marathon when she experienced fatal heart difficulties. After receiving her DDS from UI College of Dentistry in 1981, McDermott-Barrett received a pediatric dentistry specialty certificate from the University of Nebraska in 1983. She practiced pediatric dentistry in Englewood, CO. She was active in her church and the Girl Scouts. She loved to run and ski.

McDermott-Barrett is survived by husband, Ed Barrett (UIC Dentistry '81), and 3 children. Memorials may be sent to the American Cancer Society, 2255 South Oneida, Denver, CO 80224.

Janet (Cooper) Rapp (PhD Entomology '48) died April 26, 1998, from complications associated with lung cancer. After earning her BS from Rutgers University in 1943,

Rapp received a fellowship from the Carbon & Carbide Chemical Corp., which led to her participation in the development of a leading insect repellent. She was one of the first to receive a degree in insect physiology from Illinois.

Rapp taught biology and chemistry at Doane College, Crete, NB, from 1948-1952. She spent the next 24 years as director of research for the Feed Service Corp., providing leadership for the development of Morea, the first liquid feed supplement worldwide. She was author of numerous publications in entomology and animal nutrition and her name appears on many patents.

Rapp was active in Girl Scouts, amateur radio, and the publishing of railroad history journals. She is survived by husband, William, 2 daughters, and 2 grandchildren. Memorials may be sent to Crete Public Schools Trust, 920 Linden Ave., Crete, NB 68333. ■

staff note

Paul F. Mortensen, associate director for administrative affairs, School of Life Sciences, retired in Sept. 1999. He had served as business manager for the School for almost 30 years and was involved with the planning and construction of the Chemical & Life Sciences Laboratory. He received the Chancellor's Academic Professional Award in 1993. ■

1999 Graduate Student Awards

Robert Emerson Memorial Grant—Hafiz Maherali
Harley J. VanCleave Fellowship—Xianglei Yang
Procter & Gamble Fellowship—Jennifer W. Mitchell
Clark Summer Grant—Sheila A. Lyons, Barry L. Williams
Clark Research Support Grant—Marianne Alleyne, Scott E. Converse, Sarah M. Farris, Kate George, Jared P. Hansen, Tracey E. Hickox, Clay B. Holroyd, Sheela D. Konda, Jeffrey M. Kramer, Jennifer J. Nesbitt, Edward D. Plowey, Kevin M. Robertson, Sabrina E. Russo, Hyung-shim R. Yoo, Rakan A. Zahawi
Edwin M. Banks Memorial Award—Jeffrey P. Hoover, Daniel P. Toma
Herbert Holdsworth Ross Memorial Fund Award—Jennifer L. Anderson, Duane D. McKenna, Thomas J. Near
Philip W. Smith Memorial Fund Award—Thomas J. Near, Jeffrey A. Steinmetz
John G. & Evelyn Hartman Heiligenstein Award for Excellence in Teaching of Biology—Matthew D. Ginzel
Heiligenstein Outstanding Teaching Assistant in Biology 120—Kay N. Edly
Heiligenstein Outstanding Teaching Assistant in Biology 121—Sonja J. Kemmis
Heiligenstein Outstanding Teaching Assistant in Biology 122—Steven A. Moore
DuPont Award for Outstanding Teaching by a Graduate Student in the Department of Entomology—Ellen S. Green
Award for Outstanding Teaching in Microbiology—Aaron A. Best
James E. Heath Award for Excellence in Teaching in Physiology—Sundeep A. Karnik
Award for Outstanding Contribution to Molecular & Integrative Physiology—Nathan G. Hatcher, Hugh R. Little, Jennifer R. Wood
Molecular & Integrative Physiology Outstanding Thesis Award—Daniel A. Llano
Award for Outstanding Teaching in Plant Biology—Melissa A. Georg, Tracey E. Hickox
John R. Laughnan Award—Kate George, Tracey E. Hickox
Program In Ecology & Evolutionary Biology Summer Research Grant—Julie Beckstead, Tracey E. Hickox, Duane D. McKenna, Thomas J. Near, Jennifer J. Nesbitt, Jeffrey A. Steinmetz, Mosheh H. Wolf, Rakan A. Zahawi, Jeff F. Zimpfer
Program In Ecology & Evolutionary Biology Travel Grant—Derek D. Aday, Tracy L. Galarowicz, Kate George, Matthew D. Ginzel, Tracey E. Hickox, Jason H. Knouft, Yu-Teh Kirk Lin, Peter F. Reagel, Daniel L. Rosenblatt, Sabrina E. Russo, John F. Tooker, Barry L. Williams
Program In Ecology & Evolutionary Biology Symposium Awards—Kate George, Todd E. Gosselink, Thomas J. Near, Barry L. Williams

let us *hear* from you

We are interested in hearing from you. Please complete this form or send it on a separate sheet to the address below and include photographs, news releases, or other information for subsequent editions. Our Advising Office has also asked that you include a business card so that our students can see the wide variety of opportunities available to life science graduates.

Name _____

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email address _____

Degree, Department, & Year _____

Additional Degree(s) _____

Current Title and Position _____

Company/Institution _____

Your News, Achievements, Honors _____

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School of Life Sciences Alumni Newsletter
286 Morrill Hall, 505 S. Goodwin Ave.
Urbana, IL 61801

fax: 217/ 244-1224

email: j-waite@life.uiuc.edu

Another Living Legacy...



"We are pleased to support the brilliant and innovative work being done in the School of Life Sciences at the University of Illinois at Urbana-Champaign."

—Drs. Edwin E. & Jeanne Bullock Goldberg

Edwin E. and Jeanne share a belief that in the 21st century the life sciences will be at the forefront of scientific progress and that the University of Illinois at Urbana-Champaign will be a leader in that progress. Their request of three endowed chairs to the Life Sciences at the University of Illinois will create a lasting legacy, not only in continuing quality education at the University but also in improving the quality of life for all.

Edwin has had a close relationship with the University dating back to his days as the Chief Medical Resident at Cook County Hospital in Chicago. Later he served as a clinical associate professor of Medicine at Urbana-Champaign. Jeanne was an Edmund J. James and Bronze Tablet Scholar in the class of 1969. As a radiologist she has had an intense interest in mammography and its life saving potential for women.

After retirement, they remain active in public issues, educational and governmental affairs, and nature conservancy.



For more information on making a bequest or about other gift opportunities to benefit Life Sciences at the University, please call Dr. Kathy Carter, Director of Development, School of Life Sciences, University of Illinois at Urbana-Champaign at 877-265-4910 (toll free), or e-mail at kacarter@uiuc.edu.

Edwin E. and Jeanne Bullock Goldberg Endowed Chair in Molecular and Integrative Physiology

Edwin E. and Jeanne Bullock Goldberg Endowed Chair in Molecular and Cellular Biology

Benjamin R. and Elinor W. Bullock and Edwin E. and Jeanne Bullock Goldberg Endowed Chair in Integrative Biology



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ALUMNI NEWSLETTER

winter 2000-01



"Through the Life Sciences Enhancement Fund..."

I was able to attend the Tropical Plant Systematics Course offered through the Organization of Tropical Studies in Costa Rica this summer. This course was a unique opportunity for me to study a number of varieties of tropical plants in the field and to expand my expertise in plant systematics.

I had the opportunity to enhance my skills in field research, inventory methods, and data analysis; to study plant composition in diverse tropical habitats around six biological stations; and to interact with fellow researchers.

This course, for me, was a dream come true. Although I am primarily a plant systematist, I now have a much broader appreciation of and interest in biodiversity, conservation biology, pollination biology, and seed dispersal.



Thank you for providing support for such specialized courses through your annual gifts to the Life Sciences Enhancement Fund."

—Fengjie Sun
graduate student in Plant Biology

The Organization for Tropical Studies is a nonprofit consortium of 56 universities and research institutions in the U.S., Latin America, and Australia. Founded in 1963, OTS is dedicated to providing leadership in education, research, and the responsible use of natural resources in the tropics. The University of Illinois has been a member since 1990.

The Life Sciences Enhancement Fund, supported through gifts by our alumni and friends, provides course tuition for qualified graduate students; the student's department and advisor cover travel and other expenses.

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Front cover: wetland in south central Alaska; back
cover: tundra in bloom, Alaska. Both photos
courtesy of Feng Sheng Hu, Department of Plant
Biology. See story on page 5.

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www.life.uiuc.edu/alumni/

life sciences

ALUMNI NEWSLETTER

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Sharan VedBrat: Running a Biotech Company in the 21st Century

For many of us, keeping up with the “biotech revolution” is virtually an impossible task, as new procedures, new acronyms, and new buzzwords appear almost daily. But for Dr. Sharanjit (Sharan) VedBrat it is just another day at the office. “It is very exciting to be part of the process and a part of new developments,” says Dr. VedBrat, founder of the biotech firm KamTek, Inc.

Located in Gaithersburg, MD, KamTek has been providing biotechnical services and products to support further advancements in the areas of molecular biology technology, immunology, microbiology, and cell biology since 1993.

Sharan, who earned her undergraduate and Masters degrees in India, received another MS in zoology in 1973 and her PhD in cell biology in 1975 from the University of Illinois. While at Illinois, she worked with professors James Kitzmiller and Gregory Whitt in the area of organismic developmental genetics.

“Urbana was the first place I came to from India. School-wise, Illinois was great, but weather-wise it was a disaster. I really didn’t like the winters and all that frozen precipitation! At the same time I have always been fascinated by the beauty of frozen icicles on trees with the sun shining through them.”

From Illinois, Sharan went to Kentucky Medical Center, where her focus shifted to cell biology and cancer research. She then moved to New York and worked at Sloan-Kettering, where she was exposed to hybridoma technology, a major contributor to the biotech industry in its infancy. Sharan used monoclonal antibodies to discover inappropriate levels of expressions of normal tissue antigens in tumor tissues and expression of viral antigens of noninfectious retroviruses.

After working in academics for a short time, Sharan made the shift to the business world. With her experience in hybridoma technol-



Sharing experiences with our HHMI students in April 2000.

ogy, retro-virology, and cancer research, she garnered major government contracts for a new biotech company that she co-founded with her then husband.

“At the time the AIDS epidemic was just beginning to make the headlines. Scientists still were unsure of the causative agent of AIDS. Since I had worked with Feline Leukemia Virus, which turns out to be very similar to HIV, our company became involved in

immunological and epidemiological studies of populations at risk for AIDS and cancer."

"We also had a government contract to develop monoclonal antibodies to viruses that were, at that time, only of interest to the Army. One such virus is now in the news—the West Nile Virus."

Several companies were making AIDS screening test kits to assure the safety of the nation's blood supply. "The Food & Drug Administration contracted with us to assist in quality assurance for each production lot from each company. We also developed reference panels of sera to monitor performance of these test kits."

Sharan continues her work in the area of HIV screening and monitoring. "Currently it costs about \$100 for an HIV monitor kit, which is too expensive even for this country but all the more so for third world countries." With the Center for Disease Control, Sharan is working to develop a less expensive and simple-to-use screening/monitor test kit. But she notes, "The approval process is long and it is expensive to market such a product in the US."

"An advantage for my system is the small sample size required, maybe only 0.2-0.5 ml of blood. This will allow newborns at risk of having HIV to be tested within 2-3 days of birth with just a small withdrawal of blood."

With the help of Small Business Innovation Research grant funding, Sharan has been studying the feasibility of using PCR (polymerase chain reaction) methodologies to develop DNA tests for *Leishmania*, a protozoan parasite carried by tsetse flies, and for HIV. "I had worked at Illinois on mosquitoes as vectors of the protozoan plasmodium, and I just built on that experience, along with my diagnostics and PCR experiences." Her goal has been to find a universal system for test kits.

Sharan's company has developed KamPlates™—a plastic plate with 96 micro-wells with covalently linked oligonucleotide probes. With this plate, 96 samples for a given virus or gene can be tested at one time.

Or a plate can be set up with mini gene-arrays. Plates with such arrays can be used to study polymorphic genes, to test for different variants of highly mutagenic patho-

gens such as HIV, to test for the presence of different pathogens from the same clinical sample (e.g., testing for hepatitis B virus, herpes simplex virus, cytomegalovirus, Epstein-Barr virus, HIV, and HTLV in the same blood sample), or to study expression of different genes for the same metabolic pathway or disorder.

"Currently a major emphasis at KamTek is the development of these plates, as well as the development of follow-up technologies. But our services are also expanding into other areas, such as growing neurons in culture and other primary cultures for the National Institutes of Health and for the pharmaceutical industry for drug development and testing."

Sharan enjoys running her own business. "My biggest reward is that if I want to do something, no one can tell me that I can't. I just do it! There is a sense of achievement and the understanding that I am still contributing to science, just in a different way."

However, owning and running a business is not without its challenges. "You feel that you have to do everything. If a job has to be done, it is your responsibil-

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Running a Biotech Company

ity—whether it's paying bills, delivering products, or working in the lab."

Sharan readily admits that she wishes she had had more business-related classes. "I have had to learn a lot of things on the job, like how to incorporate a business, how to apply for patents, and how to advertise. I often wish I had more training in these areas."

Because Sharan appreciates the value of hands-on experience, she offers internships for community college students in the area. "They may have had course work, but they need to have work experience—even sometimes in such tasks as how to handle a pipette."

In April 2000, Sharan came back to campus and shared her experiences and insights with students through the Howard Hughes Program for Undergraduate Education in the Life Sciences. "Sharing experiences with students is very important—as well as being a delight." ■

For more information about KamTek, Inc., see www.kamtekinc.com/. Sharan has one son, who received his degree in computer sciences from Purdue University. "He is carrying on his parents' legacy of pursuit of technological advancements in his own way," Sharan commented recently.

High-tech Research Park on Campus

On March 2, 2000, Governor George Ryan joined University of Illinois Trustees in a ground-breaking ceremony for the new research park on the Urbana-Champaign campus. The park represents a collaborative effort between the University, the State of Illinois, and local developers. It is designed to encourage research, development, and commercialization of the University's intellectual assets, and to foster economic growth through the creation of jobs.

The University's overall plan in this new venture includes two research park areas on the north and south ends of the campus. The parks will target tenants working in the areas of engineering, information technology, and biotechnology. An expanded Technology Commercialization Lab, or incubator, will be included to help high-tech start-up firms develop their ideas.

Chancellor Michael Aiken emphasized that the University must be aggressive and flexible in its transfer of new

technology to the marketplace. He remarked, "The research park will aid us in attracting the very best new faculty. And our students will benefit from more chances to work with cutting-edge companies. In fact, the research park and the companies it attracts and grows will help to keep Illinois' sharpest minds in Illinois."

The plans for the research park fit in with other capital priorities on campus, including the building of a new Post-Genomics Institute. The legislature approved \$7.5 million in planning and initial construction support for this institute. These new capital priorities link the University to the state's VentureTECH initiative, which seeks to strengthen Illinois' standing in the high-technology sector.

President Stukel remarked, "The State of Illinois has taken a huge step toward its quest to become a leading high-technology state in the heartland." ■

Studying Global Climate Change Using Natural Experiments of the Past

Is the earth getting hotter? Are the severe storms being experienced worldwide due to global warming? Such topics have scientists and politicians debating man's impact on the environment.

Feng Sheng Hu, assistant professor of Plant Biology, is also very interested in the effects of global climate change on ecosystems and biogeochemical processes—but over a geological time scale.

“There is no doubt that the climate has changed. But to understand the effect of those changes, I study the ‘natural experiments’ of the past that are archived in geological deposits, such as lake sediments,” says Hu.

The wide variety of proxy environmental records in these deposits have major advantages over other ecological data. “These records provide a long holistic perspective into ecosystem states and biogeochemical processes that do not exist today, but may be analogs of what may happen in the future.”

Hu's laboratory uses such proxy indicators as pollen, stable isotopes, and elemental chemical composition of sediments to address questions of biotic response to climate change at various spatial and temporal scales.

They are also developing a new area of study, molecular paleoecology. They are using molecular genetics techniques to help identify species represented by the pollen grains found in sediments. “The pollen grains of various spruce species, for example, visually look the same. Using genetic markers will allow us to more accurately determine species and ecosystem composition.”

Hu and other scientists have found that climate can shift abruptly. “About 11,000 years ago, there was a major warming event of about 8 degrees Celsius in a several decade time frame. This event is well documented in the north Atlantic, and was probably driven by changes in ocean circulation patterns. I am investigating the effects of this abrupt change in the North Pacific region.”



They have also recently reported in a *Nature* article that there were sudden cooling events within the last 10,000 years. Hu and colleagues from the University of Minnesota studied sediments from Deep Lake in northern Minnesota and previously published data on ice cores from near the summit of the Greenland ice sheet. They looked at the thickness of sediment layers in the lake bottom, which accumulate seasonally and reflect the amount of dust, organic material, and other debris settling in the lake over time.

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Global Climate Change

They found that the northern Great Plains experienced a prolonged cooling between 8,900 and 8,300 years ago, apparently caused by the collapse of a huge ice dome, a remnant of the last ice age, in what is now Hudson Bay. With this mile-high dome of ice no longer blocking the way, polar air flowed into the northern plains. Warmer air masses from the Caribbean and the Gulf of Mexico no longer dominated the weather patterns, and snow accounted for a greater proportion of the total precipitation.

Even without man's influence, climate can shift

just part of the natural climate cycle? If it is part of the natural cycle, what events signal the approach of the next drought, and can those signals be overridden by other factors, such as human-induced climatic warming? Hu's laboratory is conducting climate cycle studies to address such questions.

To begin to understand whether the 20th century has been a particularly warm one, Hu is conducting experiments in Alaska. Such high-altitude regions are projected to be highly susceptible to global warming, and there is evidence for

ing of all of those factors to be able to predict future change."

To help understand mechanisms of ecosystem response, Hu is studying one of the National Science Foundation's Long-Term Ecological Research sites in northern Alaska. This site is particularly intriguing. There is one landscape study area approximately 500,000 years old, which was not glaciated during the late Quaternary, immediately adjacent to a landscape area that was exposed by the retreat of the last glacier and is only about 15,000 years old.

The "old" landscape has been subject to extensive weathering, so there is a finer substrate texture, lower nutrient availability, and more extensive cover of tussock plant communities. Soils rich in organic carbon are confined almost entirely to the "old" landscape.

"We know these two areas have been subject to the same climatic events. By studying them, we can begin to understand the interactions between climate and landscape factors in determining carbon cycling and ecosystem states." The assessment of these complex interactions among climatic change, landscape factors,

"Understanding the naturally occurring climate variations of the past will help give us a framework against which human effects can be assessed."

abruptly, over a period of only about 50 years, resulting in long-term environmental effects. "Understanding the naturally occurring climate variations of the past will help give us a framework against which human effects can be assessed."

For some Americans, the "dust-bowl" days of the 1930s are very bad memories of drought, crop failure, and hardship. But was this an unusual event, or was it

warming in the last several decades in Alaska. "My data show that there has been a warming trend during the last 150 years, but that increase may be within the range of natural variation in the past 2,000 years."

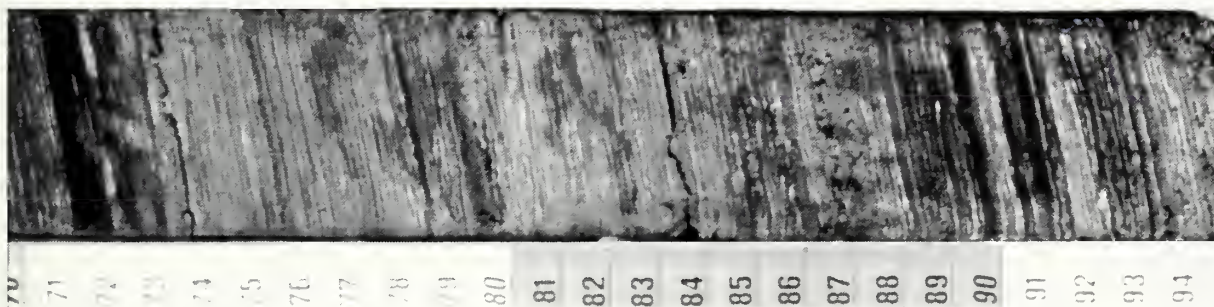
Answering questions of global climate change within ecological contexts is not an easy process. "The earth is a complex system affected by numerous factors. You really need to have an understand-

and carbon cycling is funded by the National Science Foundation.

"Although I started out as a botanist, I have always been very interested in the interfaces between different disciplines—atmospheric sciences, chemistry, geology, and biology."

Hu's unique blend of disciplines and insight has recently been recognized by The David and Lucile Packard Foundation. They have awarded him one of 24 Fellowships for Science and Engineering in 2000. These 5-year fellowships, providing \$125,000 each year, are

designed to allow the nation's most promising young professors to pursue their innovative research programs with few funding restrictions and limited paperwork requirements. Only 50 universities in the US are asked by the Packard Foundation to submit nominations. ■



Annually laminated sediments (varves) are among the best archives of environmental changes, because they provide exceptionally high-quality chronometers. In the core sample above, each couplet of a light layer and a dark layer represents sediment deposition of one year, much like annual growth rings on trees. The light layer is primarily calcite precipitate through photosynthesis in the summer, and the dark layer includes clastic and organic debris deposited in other seasons. Hu's laboratory analyzes the varved sediments using a suite of geochemical, sedimentological, and biological proxies, including varve thickness, organic and inorganic carbon, detrital minerals, mineralogical composition, grain size, oxygen and carbon isotopes of carbonates and ostracode shells, trace-element composition of ostracode shells, and pollen. Below left: collecting sediment samples from the float of an amphibious airplane. Below right: Tungak Lake, Alaska, showing the campsite.



Hu earned his BS in biology from Xiamen University in 1983, his MS in botany from the University of Maine in 1990, and in 1994 his PhD in ecosystem science and conservation from the University of Washington. Hu was a postdoctoral fellow at the University of Minnesota in the NSF Research Training Group on Paleorecords of Global Change. He came to the University of Illinois in 1998.

New Administrative Structure for Life Sciences



Delcomyn



Miller

In 1993, then Dean Larry Faulkner set in action a process to reorganize the School of Life Sciences. A part of that reorganization became official on July 1, 2000.

On that date, the School of Life Sciences became two schools—the School of Integrative Biology (SIB) and the School of Molecular & Cellular Biology (SMCB). Dean Jesse Delia has appointed Fred Delcomyn, professor of Entomology, as SIB's first director and Charles Miller, professor of Microbiology, as SMCB's first director.

SIB consists of the departments of Animal Biology (formerly Ecology, Ethology & Evolution), Entomology, and Plant Biology and the programs in Ecology & Evolutionary Biology and Physiological & Molecular Plant Biology.

"Reorganization of the life sciences at the University of

Illinois has provided us with a unique opportunity to meld the departments mainly concerned with organismal and systems biology into a single, cohesive unit," said Delcomyn. "Each department retains its own identity, yet the School will act as a unit to determine future research and educational directions."

As a part of the reorganization, a new interdepartmental graduate program in Ecology & Evolutionary Biology has been established. This program builds on the long tradition of excellence in ecological research at the University. The program admitted 13 new students for fall 2000.

SMCB consists of the departments of Biochemistry, Cell & Structural Biology, Microbiology, and Molecular & Integrative Physiology and the programs in Biophysics & Computational Biology and Neuroscience. Biochemistry transferred into the new school from the School of Chemical Sciences.

"No scientific discipline has changed more in the last 30 years than biology," said Miller. "Molecular and cellular biology is now an autonomous discipline in biology. By drawing together our nationally recognized faculty in SMCB, we can reinforce the ties between teaching and research."

As a part of the reorganization, new undergraduate curricula have also been approved by campus. These curricula, pending approval by the Illinois Board of Higher Education, will be offered beginning fall 2001.

Incoming biology freshmen will take two lecture courses, one offered by each School. These introductory courses will set out basic facts and ideas of biology that define the subject matter of each school. From that introduction, students then will elect to major in Integrative Biology or Molecular & Cellular Biology. The specialized curriculum in Biochemistry will still be offered, as will undergraduate degrees in Biology Honors and Biology Teaching. ■

For more information, see our websites, www.life.uiuc.edu/sib/ and www.life.uiuc.edu/mcb/

Odum-Kendeigh Endowment Supports Ecology Program



A young Odum (on right) with Shelford (left)

In 1996, Eugene P. Odum (PhD Zoology '39) made a gift to the University—and also issued a challenge. With his gift of \$25,000 to establish an endowed fund to support graduate student research in ecology, Odum challenged alumni and friends of ecological research and education to match his gift. If they would do so, then Odum agreed to contribute another \$25,000 to the endowment.

In January 2000 that challenge was met, based in large part on the generosity of Robert V. Kennedy (BS '55, MS Zoology '58). Kennedy told a surprised student caller during the annual fund drive of his wish to make a major gift of stock to this endowment.

Odum requested that the endowment honor his mentor at the University of

Illinois, S. Charles Kendeigh. The College decided to honor Odum as well, so the fund became the Eugene P. Odum—S. Charles Kendeigh Endowment.

Ecology at the University has a tradition of excellence, dating back to the early 1900s. Victor Shelford, a professor of Zoology from 1914 to 1947, was instrumental in developing the field of animal ecology in North America.

S. Charles Kendeigh, a student of Shelford, earned his PhD from Illinois in 1930. In 1936 he returned to Illinois as Shelford's understudy, and together they made Illinois a major center for ecology. Kendeigh pioneered ecological energetics, a major component of both population and ecosystem ecology. Kendeigh was mentor to 111 graduate students, including Odum.

Odum is considered one of the most influential figures in the history of ecology in the 20th century. For more than half a century, he chal-

lenged scientific assumptions about the world around us. His textbook *Fundamentals of Ecology*, first published in 1953, influenced an entire generation of ecologists.

Odum, called the "father of modern ecology," has been at the University of Georgia since 1940, and was director of its Institute of Ecology, as well as Callaway Professor of Ecology. He retired in 1984, but remains active in promoting the awareness of ecology nationwide.

Evan DeLucia, director of the Program in Ecology & Evolutionary Biology, a new interdepartmental graduate program at Illinois, commented, "We are taking giant steps toward creating a new structure for ecology on campus. With this endowment, we can build a solid foundation of support for our graduate students—the heart of the program!" ■

Additional gifts to this endowment can be made through the University of Illinois Foundation. For information about making a gift, call our toll-free number (877) 265-4910).



Odum



Kendeigh

Millions of Monarchs, Bunches of Beetles—

An Entomologist's Insight into Social Behavior

Gilbert Waldbauer, professor emeritus of Entomology, has spent the greater part of his adult life fascinated by insects. He was “hooked” from his first class in entomology and is now generating that enthusiasm in others through his series of popular books.

“I came to the University of Illinois to get a Master’s degree in Entomology—and I never left.” Waldbauer spent 46 years in the classroom, starting as a teaching assistant and retiring in 1995 as a professor. Over the years, he has taught a number of students agricultural entomology, insect behavior, and a general education course on insects and humans.

Waldbauer is still teaching—just using a different venue. After retirement, he began writing books to help educate the general public on insects.

“I like to write. But more than that, I serve as a liaison between the field of entomology and the general public. My goal is to bring

an understanding of biology to a wider audience.”

In his most recent book, *Millions of Monarchs, Bunches of Beetles: How Bugs Find Strength in Numbers* (Harvard University Press, 2000), Waldbauer succeeds in doing just that. He imparts insights through a wealth of examples on the benefits of group living for insects populations in more or less unorganized groups and simple societies.

“Many scientists have studied and written about the complex societies of ants, bees, and wasps. In essence, these societies are large families. For example, all honey bee workers in a hive, are daughters of the queen. This book examines insect societies in which unrelated individuals cooperate.”

“Group living at any level is important in the ecological scheme of things, because it enhances survival.” Every insect has to accomplish three things to survive. It must eat and grow; it must keep from being eaten, and it must find a suitable



mate and reproduce. For many insects, there is truly strength in numbers—and therefore survival.

One example of cooperative feeding behavior is found in bark beetles (family Scolytidae). These small beetles spend most of their lives under the bark of trees. Adults bore through the bark to the interface between the bark and wood. They feed as they burrow along this interface, forming a tunnel where they lay their eggs. Each newly hatched larva begins its own tunnel at the bark-wood interface.

The beetles' boring damages the tree's cambium (growth layer) and phloem (the complex of tubes that carries nutrients from the leaves to the roots). The tree, however, is not without defenses, and responds by flooding the tunnels with resin to trap or drown the beetles.

The bark beetles fight back by producing aggregation pheromones, which will attract more beetles to that tree. The beetles also inoculate the tree with spores of several fungi, which they carry in specially adapted hollows in their body, that help weaken the tree. A healthy tree will win the battle unless many beetles join in to subdue it. The beetles will breed in the weakened and dying tree.

Tiny leaf beetle larvae know the importance of numbers to ward off predators. They will "circle the wagon" when threatened by the predatory stink bugs. The larvae make a compact cluster, with their heads facing inward and their armored tail ends providing an impenetrable shield. As long as the circle is unbroken, the larvae are safe from attack—and at the same time they can continue to feed.

One interesting example

Waldbauer relates about the importance of numbers in finding suitable mates is the firefly trees of southeast Asia. These fireflies have favorite trees where they gather by the millions. The males will flash their light-producing organs in almost perfect synchrony, creating a light bright enough that local rivermen use these trees as navigation markers.

"The more males that flash and the brighter the signal, the more females that will be attracted. In the densely forested jungle-like areas of Asia, a lone male cannot be seen from a distance. But even in a dense forest, the glow of a large and brightly shining firefly tree can attract thousands of females from a large area."

These are just three examples from a book that includes myriads of mayflies, legions of locusts, and swarms of cicadas, not to mention, of course, millions of monarchs, and bunches of beetles.

In this fourth popular book, Waldbauer continues his quest for scientific accuracy while relating the story with infectious enthusiasm. His other popular works are *Insects Through the Seasons* (Harvard University Press, 1996), *The Handy Bug Answer Book* (Visible Ink

Press, 1998), and *The Birder's Bug Book* (Harvard University Press, 1998).

Waldbauer's popular writing efforts are not yet finished. He is currently working on a new book, tentatively titled *What Good Are Insects?* "This book will explore the ecological roles of insects and their importance to the health of ecological systems. For example, there are approximately 900,000 species of known insects. About 500,000 of those species feed on plants. For animals that don't eat plants, plant-feeding insects may be a very important component of their diet, and their link to the energy stored through photosynthesis."

Waldbauer also was quick to note that he was not the only book-publishing entomologist in the department. *Buzzwords: A Scientist Muses on Sex, Bugs, and Rock 'N Roll* (Joseph Henry Press, 2000) is May Berenbaum's fourth popular work. Jim Nardi is currently working on his third popular book, and Fred Delcomyn authored a textbook on neurobiology in 1997.■

Waldbauer earned his PhD in Entomology at UIUC in 1960. Although he retired in 1995, you can still find him most days in his Morrill Hall office. Waldbauer has two daughters.



Jorge Guerrero: The “Life Cycle” of a Parasitologist

As Jorge Guerrero sits in his office at Merial in New Jersey and talks about his retirement plans, there is an air of youthful enthusiasm.

“I am so fortunate. I will have a new opportunity to share my experiences with students after I retire. I look forward to teaching again. I enjoy the stimulation and challenge that students bring,” says Guerrero.

Guerrero, a native of Peru, received his DVM degree from San Marcos University in Lima, the oldest university in the Americas (established in 1551).

“While I was in Veterinary School, I took a course in parasitology and enjoyed it. That summer, I went with a team into the Andes Mountains to study sheep parasites. They left me there to finish the study. My pay was a new pair of rubber boots.” That summer helped shape a career devoted to understanding parasites and mechanisms for their control.

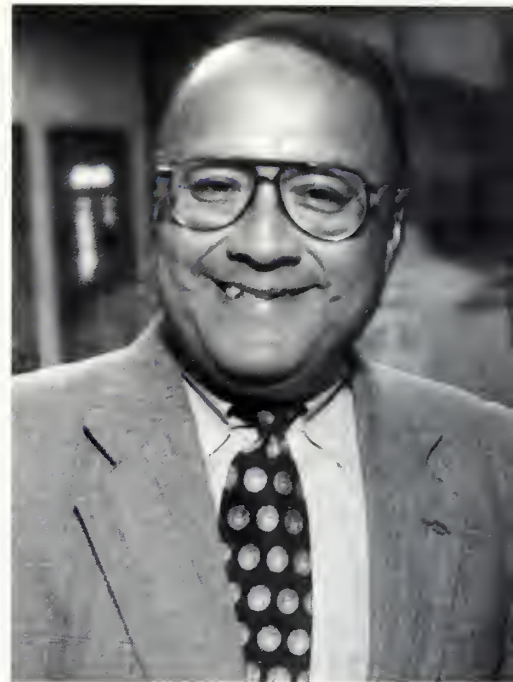
“Parasites have such a tremendous survival capac-

ity.” Despite control techniques and chemotherapy, parasites continue to thrive. Their complex life cycles and sophisticated mechanisms continue to intrigue Guerrero, especially those of the nematodes. “The more I learn about them, the more I admire them.”

Guerrero’s education continued at the University of Illinois. “I didn’t choose Illinois, it was selected for me by Fullbright, but their choice changed my life.” With that travel scholarship, he started work on his MS degree.

While at Illinois Guerrero worked with two renowned parasitologists—Paul Silverman, professor of zoology, and Norman Levine, professor of veterinary medicine.

“When I came to the US, I didn’t know much about the PhD degree. But after I started working on my Master’s I grew confident and was encouraged to continue my studies. Illinois was very generous and gave me an assistantship to allow



me to complete my PhD in 1971. I am very grateful to Illinois for that opportunity.”

Guerrero returned to Peru with a new PhD degree and a new wife. “My wife Mary Anne is my true treasure from Illinois.” For a year, they lived in Peru but the political situation was very unstable. Guerrero then accepted an invitation to join the faculty of Escola Paulista de Medicina in Sao Paulo, Brazil.

While in Brazil, he joined Johnson & Johnson, who brought him back to the US

in 1976. In 1984, Guerrero was hired by Merck, in the division that is now Merial. Merial is an animal health business jointly owned by Merck & Co., Inc., and Aventis S.A.

Guerrero in his career and in the field has held a number of positions. He has spent time at the lab bench developing pharmaceuticals, including ivermectin. In the mid-1980s ivermectin helped revolutionize the treatment of parasites. It is a broad-spectrum medication that is effective against common intestinal worms, larval heartworms, most mites, lice, and ticks.

"I have enjoyed working in industry because I like to see results quickly. And in industry you must always be looking for practical solutions to problems."

Guerrero's skills were not limited to helping develop pharmaceuticals, however. He moved into the general management area. "Technical services and marketing were very rewarding, because I could help influence and guide people in the use of products."

In 1993, Guerrero went to Spain, where he directed all aspects related to running the business in the Iberian

region. In 1996, he was transferred back the US where he has been head of veterinary services for North American operations.

Despite the advances in pharmaceuticals and control techniques, parasites are still the major problem in animal production and in companion animals. Guerrero sees the development of designer vaccines as the next revolution in parasite control.

"With advances in understanding the genomic sequences of parasites, it may be possible to develop tailor-made control for parasite species." Guerrero notes that Silverman proposed doing this in the late 1960s; however, it was not technically feasible at that time.

Development of new pharmaceuticals is a very expensive and time-consuming process. Merial makes a substantial investment in research and development and testing before any new drug is released.

Animal health products are regulated by a number of federal agencies, including the Food and Drug Administration, the US Environmental Protection Agency, and the US Department of Agriculture. "All the pharmaceuticals and vaccines

developed today must be safe, effective, and environmentally friendly."

"Of course, in the future it may be possible to develop, for example, designer chickens that are resistant to *Salmonella*, eliminating the need to use antibiotics in the feeds."

Guerrero was recently invited by Silverman to participate in a conference sponsored by the American Academy of Arts and Sciences (Western Division) to look at how the biotechnology revolution will affect us. "This was an experience you only dream of—it was overwhelming and it was such an honor to be there with my mentor."

Which brings us full circle to Guerrero's retirement plans. "For the first five months after I retire, I plan to go back to Peru to teach on a Fullbright grant. It will allow me to continue my career where I started."

After a recent brush with colon cancer, Guerrero comments that "I am a survivor—like my parasites." And we wish him well in this new stage of his "life cycle" as he shares his enthusiasm for science with a new generation of students.■



Link Found between Lack of Neurons and SIDS?

Studies at the UI have identified a specific brain pathway in which neurons activate in times of low oxygen (hypoxia) and trigger increased breathing.

The findings of the research—based on studies of electrical currents in rat brains—have led the scientists to postulate that many newborns don't have enough neurons to respond sufficiently to hypoxia. Such a deficit in response capability, they say, possibly is a factor in sudden infant death syndrome, which each year claims the lives of 3,000 babies under a year old in the United States.

"It is not fully understood why newborns, whether they are humans, rats, cats, dogs or whatever, do not have a maintained response to low oxygen," said Tony

G. Waldrop, professor of Molecular & Integrative Physiology. "My lab has shown that neurons in some of the brain areas involved in the control of breathing are inherently sensitive to low oxygen. This sensitivity increases over developmental time. Newborn animals have far fewer neurons that respond to hypoxia than do adults.

"It may be that babies prone to SIDS do not have the same level of ability of typical newborns," he said. "Maturation of these cells may be at lower levels in these babies."

In a study published in the November *Journal of Neurophysiology*, Waldrop and his colleagues describe the activity of sodium currents—electrical streams of ions or group of atoms—involved in neuron communication in the caudal hypothalamus and the ventrolateral medulla of rat brains.

In times of hypoxia in adult brains, they found, there is "a significant increase in the persistent sodium current," which is

most likely the primary mechanism for the activation of neurons that help to regulate cardiorespiratory activity. Such a reaction, however, was not seen in rats less than 12 days old, suggesting that the brain pathway in neonatal rats may not be sufficiently developed to respond.

The research was part of the doctoral dissertation of Eric M. Horn, now a neurosurgery resident at the Barrow Neurological Institute in Phoenix. Waldrop is the UI vice chancellor for research and a professor in the College of Medicine. Their research was funded by grants from the National Heart, Lung, and Blood Institute and the American Heart Association.

In the October issue of *Neuroscience*, Waldrop and Horn reported that in live, conscious rats, the neurons activate and generate a protein called Fos when exposed to a period of hypoxia. "This work has clearly shown that sodium ions mediate the neuronal response to low oxygen." ■

Story by Jim Barlow, News Bureau Staff Writer, University of Illinois. Appeared in Inside Illinois, November 16, 2000.

Woese Wins National Medal of Science



Carl Woese, Ikenberry Chair and professor of Microbiology, was one of a dozen scientists announced as winners of the National Medal of Science in November 2000.

"These exceptional scientists and engineers have transformed our world and enhanced our daily lives," President Clinton said in a White House press release.

Established in 1959, the National Medal of Science honors scientists in the full spectrum of scientific fields, and is considered the nation's highest scientific award.

The White House release said Woese's "work in proposing the notion that there are three primary evolution-

ary domains into which all living things may be classified led to a quantitative map, or universal tree of life, by which the diversity of all life can be assessed."

Woese and colleagues, particularly Ralph Wolfe, emeritus professor of Microbiology, characterized methanogens—anaerobic bacteria that produce methane gas as a metabolic by-product—by molecular techniques that compared RNA. Through their work they discovered Archaea. These microorganisms live in extreme, oxygen deprived environments.

"Carl Woese's discovery and elucidation of archaea, in essence a third form of life, fundamentally transformed our view of biology," said Richard Herman, UI Provost.

Woese commented, "This award represents a recognition by peers and public alike that the incredible diversity of life on this planet, most of which is microbial, can only be understood in an evolutionary framework." ■

2000 Graduate Student Awards

Robert Emerson Memorial Grant—Julie Beckstead
Harley J. VanCleave Fellowship—Sheila A. Lyons-Sobaski

Procter & Gamble Company Doctoral Student Research Award—David J. Schulz

Clark Summer Grant—Jennifer J. Nesbitt, Kevin M. Robertson

Clark Research Support Grant—Sean A. Collins, Matthew D. Ginzel, Jeffrey S. Heilveil, Jason H. Knouft, Sheila D. Konda, Yiching Lin, Rebecca A. Petersen, Edward D. Plowey, Joseph R. Pomeroy, Kevin M. Robertson, Sabrina E. Russo, Daniel C. Skivin, Fengjie Sun, Barry L. Williams, Moshe H. Wolf, Liudmila S. Yafremava

Edwin M. Banks Memorial Award—Jennifer J. Nesbitt

Herbert Holdsworth Ross Memorial Fund Award—Fengjie Sun, Barry L. Williams

Philip W. Smith Memorial Fund Award—Karin N. Nelson, Moshe H. Wolf

John G. & Evelyn Hartman Heiligenstein Award for Excellence in Teaching of Biology—Nathan D. Lading

Heiligenstein Outstanding Teaching Assistant in Biology 120—Peter F. Reagel

Heiligenstein Outstanding Teaching Assistant in Biology 121—Fengjie Sun

Heiligenstein Outstanding Teaching Assistant in Biology 122—Julie A. Cianfroga

Ellis MacLeod/DuPont Award for Outstanding Teaching by a Graduate Student in the Department of Entomology—John F. Tooker

Award for Outstanding Teaching in Microbiology—Theresa D. Ho

James E. Heath Award for Excellence in Teaching in Physiology—Nathan G. Hatcher

Award for Outstanding Contribution to Molecular & Integrative Physiology—Joseph A. Beatty

Award for Outstanding Teaching in Plant Biology—Jennifer L. Anderson, Fengjie Sun

John R. Laughnan Award—Yoon Shin Cho, Fengjie Sun

Program in Ecology & Evolutionary Biology Summer Research Grant—David R. Chalcraft, Steven J.

Cooke, Kate George, Gretchen A. Gerrish, Tracey E. Hickox, Sheila A. Lyons-Sobaski, Barry L. Williams, Moshe H. Wolf, Jeff F. Zimpfer

Program in Ecology & Evolutionary Biology Travel Grant—Julie Beckstead, Yehuda Ben-Shahar, David R. Chalcraft, Steven J. Cooke, Tracey E. Hickox,

Jason H. Knouft, Lynn B. Martin, Jennifer J. Nesbitt, Kevin M. Robertson, Sabrina E. Russo,

Fengjie Sun, Elisa M. Tarlow, Heather D. Vance, Barry L. Williams, Moshe H. Wolf

Program in Ecology & Evolutionary Biology Symposium Awards—Julie Beckstead, Lynn B. Martin,

Jennifer J. Nesbitt, Lauren M. Pintor, Cory D. Suski

Katzenellenbogen Honored as Swanlund Chair



Benita S. Katzenellenbogen, professor of Molecular & Integrative Physiology and Cell & Structural Biology, was selected in March as a Swanlund Chair, the highest endowed title awarded to a UI professor.

Katzenellenbogen, or Dr. K for short, received her BA degree from the City University of New York, and earned MA and PhD degrees from Harvard University. She completed a postdoctoral position at the University of Illinois, and then joined the faculty in 1971.

As a cancer biologist and endocrinologist, Dr. K's interests are in the endocrine treatment and prevention of breast cancer. Her laboratory works on many aspects of women's health, including the actions of estrogens and other female reproductive hormones in normal and cancer target cells in the reproductive system and outside of the reproductive system, including bone and the cardiovascular system.

Her research focuses on the regulation of gene expression and cell prolifera-

tion by hormones and growth factors: mechanisms of hormone and antihormone action in normal and cancer cells, with particular emphasis on breast cancer. Her laboratory has played a key role in understanding the biology of estrogen and progesterone receptors and in elucidating mechanisms by which antiestrogens and SERMS, such as Tamoxifen and Raloxifene, are effective in controlling breast cancer.

Current research includes changes that occur in breast cancers that result in their resistance and limit the effectiveness of Tamoxifen treatment, and on developing more selective and effective antiestrogens and SERMS for breast cancer.

Her research has been published in more than 170 journal articles, and she has received numerous awards, honors, and fellowships. Among them, she received the MERIT Award from the National Cancer Institute at the National Institutes of Health, the Distinguished Scientist Award from the Susan G. Komen Breast

Cancer Foundation, and the Jill Rose Award for outstanding research from the Breast Cancer Research Foundation.

A fellow in the American Academy of Arts and Sciences, Dr. K was recently appointed as a professor in the Center for Advanced Study—the highest form of recognition the campus bestows on faculty members for outstanding scholarship.

This year she is serving as president of the Endocrine Society, one of the oldest, largest, and most distinguished organizations devoted to research on hormones and the clinical practice of endocrinology, including the study of diabetes, infertility, and the neuroendocrine system.

Dr. K also considers training graduate students and postdoctoral scientists as an important part of her work. "I'm proud of the legacy of trainees and associates who are making important contributions of their own." ■

Milan K. Bagchi, associate professor in Molecular & Integrative Physiology, studies mechanisms of gene regulation by steroid and thyroid hormones.

Michel Bellini, from Pierre & Marie Curie University, Paris, France, joined Cell & Structural Biology as an assistant professor. His research is designed to help define the functional organization of organelles in the nucleus, and their role in molecular events regulating gene expression.

Chi-Hing Christina Cheng, who earned her PhD from UIUC, joined Animal Biology as an assistant professor. Her research involves the molecular evolution of antifreeze proteins in cold-water fishes in the Arctic and Antarctic Oceans. She will be teaching general evolutionary biology as well as molecular evolution.

C. Lee Cox, who earned his PhD from the University of California-Riverside, is an assistant professor in Molecular & Integrative Physiology and Pharmacology. His research focuses on understanding cellular mechanisms underlying behavioral plasticity. He concentrates on the neurophysiology and pharmacology of neocortical and thalamic neurons in the mammalian central nervous system.

James Dalling, who received his PhD from Cambridge

University, is an assistant professor in Plant Biology. Dalling has field work and lecturing experience in Jamaica and Panama and based on his expertise in tropical ecology is an honorary lecturer at the University of Aberdeen, Scotland. His research focuses on processes that maintain species and life history diversity in plant communities, and in the application of methods in plant population and community ecology to manage tropical forests. Prior to joining UIUC, he worked for the Smithsonian Tropical Research Institute in Panama. He will be teaching courses on community and landscape ecology.

Huey Hing, assistant professor of Cell & Structural Biology, is studying signaling mechanisms that allow neurons to extend axons with great precision over long distances to reach target cells, using *Drosophila* as a model system. Hing received his PhD from Yale University and was a postdoctoral associate at the University of California, Los Angeles.

Ziwei Huang, associate professor of Biochemistry, focuses his research on understanding the chemical basis of molecular recognition in protein-protein and protein-ligand complexes and then translating that knowledge into the discovery of new drugs. He earned his PhD from the University of California, San Diego.

Kimberly Hughes will join the department of Animal Biology in January as an assistant professor. Hughes' research focuses on mechanisms that maintain genetic variation within populations, including life-history traits, sexual selection, mate choice, and aging. She is also involved with conservation genetics to help manage sensitive species and habitats. Hughes earned her PhD from the University of Chicago.

Andrei Kuzminov, who earned his PhD from the Institute of Cytology & Genetics, Novosibirsk, Russia, is an assistant professor in Microbiology. His research activities assess the phenomena associated with DNA damage formation and its subsequent recombinational repair. He will teach a class on the molecular biology of microorganisms.

Tzumin Lee, assistant professor of Cell & Structural Biology, earned his PhD from Johns Hopkins School of Medicine and then went on to a postdoctoral position at Stanford University. His research focuses on the development of the *Drosophila* central nervous system, particularly molecular mechanisms underlying neural circuit formation and reorganization. Such information may lead to novel therapeutic interventions for developmental and degenerative neurological disorders. ■

faculty updates

May R. Berenbaum, professor and head of Entomology, was one of the first recipients of the Campus Award for Excellence in Public Service. The awards program was developed to recognize those who fulfill the university's commitment to using their scholarly, creative, or professional knowledge to improve the well-being of Illinois citizens. Berenbaum has been active in public service since she arrived at UI in 1980. According to one of the nomination letters, she has an "extraordinary commitment to educating the public about complex issues in ecology and evolutionary biology." Another letter supporting her nomination pointed out, "Professor Berenbaum does not come 'down' from the ivory tower to greet her public, but instead lifts everyone she touches to a higher plane of scientific appreciation, be they students or impressionable young children."

In 2000, Berenbaum's term as a Swanlund Chair was extended by an additional 5 years in recognition of her continuing professional accomplishments and standing.

Daniel R. Bush, professor of Plant Biology and chair of the Program in Physiological & Molecular Plant Biology, recently completed his second year as secretary of the American Society of Plant Physiologists. The Society's 5,000 members are academic, government, and industry plant science

research from the US and more than 50 other nations.

Daniel R. Bush and Evan H. DeLucia were promoted to full professors in Plant Biology in August 2000. Akira Chiba, Cell & Structural Biology, and James M. Slauch, Microbiology and Basic Sciences (College of Medicine), were promoted to associate professors.

Fred Delcomyn, professor of Entomology and director of the School of Integrative Biology, is one of the UI's faculty athletic representatives. Along with Rose Mary Cordova-Wentling, he serves as liaison between the NCAA and campus and between the Big Ten and campus. Faculty members fill these positions to ensure that athletics on campus remains under faculty control.

Susan Fahrbach, associate professor of Entomology, was selected as a University Scholar for 2000-01. David M. Kranz, professor of Biochemistry, was selected for this honor in 1999-2000. This program was created to honor and reward outstanding teachers and scholars. Since the program began in 1985, 345 scholars have been named and about \$8 million awarded to support their teaching and research. Funding for the program comes from private gifts to the UI Foundation's Advancement Fund.

John A. Gerlt, professor and head of Biochemistry, was invited to present the Harland G. Wood lectureship in May 2000 at Case Western Reserve Medical School, Cleveland, OH. He was also an invited speaker at the Enzyme Structure-Function Meeting in Fraser Island, Australia, in September 1999.

Martha U. Gillette, professor and head of Cell & Structural Biology, served as a member of the board of directors of the National Sleep Association and on the task force on the future of sleep for the American Sleep Disorders Association. In 1999, Gillette received a certificate of appreciation from the National Center for Sleep Disorders for her contributions to promoting sleep research.

William Greenough, professor of psychology and neuroscience, was quoted in an August 15, 2000 *New York Times* story on the breakthrough by which researchers have been able to produce nerve cells in the lab. The story also appeared on *excite.com*, and in the *Toronto Star* and an Associated Press dispatch.

Greenough was also recently named to the search committee for the new chancellor for the Urbana campus.

Larry Hanks, assistant professor of Entomology, received the 2000 Entomological Society of America's Recog-



Berenbaum



Gillette



Lauterbur

nition Award for Distinguished Achievements in Urban Entomology at the Society's annual meeting in December in Montreal.

Paul C. Lauterbur, Center for Advanced Study distinguished professor of Medical Information Sciences, Chemistry, Molecular & Integrative Physiology, Biophysics & Computational Biology, and Bioengineering, received the Doctor of Science degree, *honoris causa*, at the 170th commencement convocation of Case Western Reserve University, Cleveland, OH, in May 2000. He was honored for his accomplishments and contributions to society, especially in the field of nuclear magnetic resonance imaging. Lauterbur was also awarded the Institute of Electrical and Electronics Engineers Third Millennium Medal in June 2000.

Gene Robinson, professor of Entomology, has won an Innovation Award in Functional Genomics from the Burroughs Wellcome Fund (BWF) for research on the ritualized social activities of bees to associate individual genes with particular behaviors. Robinson, who recently was honored with a Certificate of Distinction from the Council of the International Congresses of Entomology, hopes that his BWF-funded study will link genes with aspects of complex

social behavior, then extend this knowledge to better understand human behavior and dysfunction, such as social phobias. He also was invited as a plenary speaker at the annual International Genome Sequencing and Analysis Conference, Institute for Genomic Research.

Robinson will also become director of the Neuroscience Program in January 2001.

Tony Waldrop, professor of Molecular & Integrative Physiology, was appointed Vice Chancellor for Research for the Urbana campus, in March 2000. Waldrop had held the position on an interim basis since fall 1999. Chancellor Michael Aiken said, "He has played a key role in the development of plans for the new research park and I am impressed with his excellent ideas on ways in which to increase the amount of federal and corporate research dollars coming to campus."

Dixie D. Whitt, instructor of Microbiology, and **Abigail A. Salyers**, professor of Microbiology, co-authored a new basic microbiology textbook, *Microbiology: Diversity, Disease and the Environment*. The text was chosen as the main selection for July 2000 by the Library of Science Book Club.

Benjamin D. Williams, assistant professor of Cell & Structural Biology, presented *Signaling by Adhesion Receptors*

at the Gordon Research Conference in July 2000 in Newport, RI. He has been invited to co-chair a mini-symposium on *Genetics and Genomics of Cell Adhesion* at the 40th annual meeting of the American Society for Cell Biology in December 2000. ■

retirements

Lloyd Barr, professor of Molecular & Integrative Physiology, retired in August 2000. Barr received his PhD in physiology in 1958 from the University of Illinois. He joined the faculty in 1970. His research interests have involved the kinetics of sequences of events involved in the reception and spread of cellular signals and the regulation of intracellular processes. As emeritus professor, Barr continues to study activation mechanisms in smooth muscle.

Dennis E. Buetow, professor of Molecular & Integrative Physiology and Plant Biology, retired in May 2000. He received his PhD in Zoology in 1959 from the University of California-Los Angeles. He came to the University of Illinois as an associate professor in 1965, and was promoted to professor in 1970. From 1983 to 1988, Buetow served as head of the physiology department. As emeritus professor, he is actively involved in a federal research project to produce edible vaccines. ■



Robinson



Barr



Buetow

2000 Undergraduate Student Awards

SOLS All-School Distinction—Scott E. Converse, Biology Honors
SOLS Director's Award—Mark D. Gonzalez, Microbiology
Harriett Long Award—Brianna N. Sharp, Biology Honors
Helen E. Hess Award—Stewart T. Moran, Biology Honors
Procter & Gamble Company Undergraduate Student Research Award—Susan Bartolini, Microbiology
Dr. M.L. Zellers Scholarship for Pre-Dental Students—Mariusz F. Wrzosek, Bioengineering/
 Mechanical Engineering
Dr. M.L. Zellers Scholarship for Pre-Dental Students, Honorable Mention—Christina J. Sehy, Biology;
 Maureen C. Sevaldal, Bioengineering
Mildred Parizek Zukor Outstanding Achievement Award—Mark D. Gonzalez, Microbiology
Wilmer Hellenbal Scholarship—Susan Bartolini, Microbiology; Ralph A. Crisostomo, Biology; Ivan Hadad, Cell & Structural Biology
American Institute of Chemists Foundation Student Award—Liana B. Lamont, Biochemistry
Clarence E. Brebm Scholarship—Nicole L. Collins, Biochemistry
Merck Index Award—Nicole L. Collins, Biochemistry
Thomas O. Sidebottom Award—Nicole L. Collins, Biochemistry
Yvonne S. Quinn and Ronald S. Rolfe Scholarships—Seth T. Gammon, Biophysics
Department of Cell & Structural Biology Distinguished Research Award—Ivan Hadad, Jonathan M. Rhine
Department of Cell & Structural Biology Academic Excellence Award—Amy J. Little
Ecology, Etibology & Evolution Outstanding Undergraduate Student Award—Cynthia M. Kush, Christopher K. Thompson
Entomology Undergraduate Achievement Award—C. Lydia Wraight
Clark Microbiology Outstanding Academic & Research Achievement Award—Mark D. Gonzalez
Clark Microbiology Best Academic Record Award (Junior)—Debra E. Kanter
Clark Microbiology Best Academic Record Award (Graduating Senior)—Joyce J. Ku, Kimberly J. Nicol
DeBoer Award—Susan Bartolini, Microbiology
Harvey L. Pretula Memorial Scholarship—Aikiesha N. Shelby
Molecular & Integrative Physiology Junior Academic Achievement Award—Reena J. Salgia
Molecular & Integrative Physiology Senior Academic Achievement Award—Karen J. Engberg

Susan Nagele Receives 2000 LAS Humanitarian Award

Susan Nagele, MD, (BS Biology '78) was recognized during homecoming festivities (Oct. 14) by the College of Liberal Arts & Sciences with their 2000 Humanitarian Award.

Nagele, an Urbana (IL) native, received her medical training at Southern Illinois University. But, instead of pursuing a career in the US, she immediately looked for a way to work as a doctor in the developing world. She joined the Maryknoll Mission Association of the Faithful in 1984 to work in Africa.

Since 1991, Nagele has been working in rebel-controlled southern Sudan, where a bloody civil war has been raging for decades. The fundamentalist government in Khartoum has been trying to impose strict Islamic law on the Christian ethnic tribes of the South, resulting in a struggle that has displaced 4 million people and left 2 million dead. The Sudan People's Liberation Army controls most of the South, and Nagele works under their auspices.

Disease, malnutrition, and an expanding population displaced by war gives Nagele and her assistants a heavy caseload. She may see a 100 patients a day. She is often the first doctor the native Toposa and Dinka people have seen.

The clinic at Narus, as well as one in Lotimor, are modestly staffed and supplied com-



Susan Nagele with Fred Delcomyn, director of the School of Integrative Biology, following her seminar for faculty, students and friends, "In to Africa: Health Care Challenges in War-torn Sudan."

pared to American hospitals. "Here all the patients are bare-foot. The examining room is a concrete floor, and the lavatory is an outhouse out back," says Nagele. "Compared to a US hospital, this is a shock. Compared to what was here before, this is a miracle."

Enduring heat, language barriers, and bouts of malaria and dysentery, Nagele integrates her faith into practice daily through compassion. "There is no training in kindness in medicine, but it's the most important thing."

As friend and former junior high school teacher Carol Dapogny said, "Susan walks not in the shadow but in the footsteps of other great humanitarians—the women and men who have literally given themselves for the good of others." ■

1940s

Clifford C. Roan (BS '47, MS '47, PhD Entomology '50) resides in Manhattan, KS. He was chief of the Pesticide Monitoring Branch of the US Army Environmental Hygiene Agency, and also was senior consultant for Hopes Consulting. During Roan's career, he worked as director of the Arizona Community Studies Pesticide Project, as director of Geigy Australasia Pty, Ltd., and as professor of Entomology at Kansas State University. He has also served as consultant to a number of companies and international agencies. His research specialty was pesticides and physiology of the Oriental fruit fly and related species.

1950s

William C. Marquardt (MS '50, PhD Zoology '54) is professor emeritus at Colorado State University, Fort Collins. Since graduating from Illinois, he has been a faculty member at Montana State University, Bozeman (1954-61), DePaul University, Chicago, (1961-62), Illinois (1962-66), and Colorado State University (1966-92). "I was a student of the renowned protozoologist, Richard R. Kudo (deceased 1966), but was also greatly influenced by Norman D. Levine (deceased 1999), Illinois College of Veterinary Medicine, with whom I was associated as a student and

later as a fellow faculty member." Marquardt trained 15 masters and 15 doctoral students, some of whom gained prominence in parasitology, and authored or co-authored more than 80 scientific papers and 6 books. His primary research area was coccidia (Apicomplexa). Since retiring, he has been involved in writing and editing several books.

1960s

June (Trottier) Arnold (MST Biology '68) became the health professions coordinator for Wheaton College, Wheaton, IL, in 1999. She had taught in their biology department since the 1970s.

John W. Krebs (BS Biology '69, MS Zoology '73) is a public health scientist in the Viral and Rickettsial Zoonoses Branch, Centers for Disease Control and Prevention. From 1978-81 he worked on Lassa Hemorrhagic Fever in Sierra Leone, West Africa; in 1987-88 on HIV/AIDS in Guinea, Ivory Coast, Burkina Faso, and Brazil; in 1993 on the Four Corners Hantavirus outbreak; and in 1995 on the Ebola Hemorrhagic Fever outbreak in Zaire. Krebs received a Health and Human Services Special Act/Service Award and the Secretary of HHS Recognition Award in 1994; in 1996 the HHS Secretary's Award for Distinguished Service; and in 1997 the Public Health Service Outstanding Unit Citation.

Robert S. Weinstein, MD (BS Biology '67) is professor of Medicine and director of the Bone Morphometry Lab at the University of Arkansas for Medical Sciences, Little Rock. His research includes osteocyte survival and osteoporosis.

1970s

Brian J. Bielema (BS Zoology '71) is shift supervisor of Nuclear Security, Wackenhut Corp. He is currently working on the natural history of the timber rattlesnake (a threatened species) and the status of the Eastern Massasauga (an endangered species) at an Illinois state nature preserve.

Rex Dunham, PhD (BS EEE '78) is professor and director of Fish Genetics and Genetic Engineering at Auburn University, Auburn, AL. Dunham was the first to transfer genes into fish in the US and his research has been recognized in the *Congressional Record* and featured in *Science*. He has been involved with four releases of genetically improved catfish for the aquaculture industry and has conducted the first outdoor research on environmental risks of transgenic fish. He served from 1997-99 as the program leader and senior scientist for the International Center for Living Aquatic Resource Management and is chair for Aquaculture Genetics, Conference for Aquaculture in the Third Millennium.

Suzanne Fisher (PhD Biology '78) is director of the Division

of Receipt and Referral, Center for Scientific Review, National Institutes of Health.

Stephen R. Ortman (BS Biology '74) left Motorola, Inc. in 1999, after 10 years as a senior buyer, to pursue a writing career. He is working to find a publisher for 4 books of poetry, 3 short stories, and 4 children's Christmas stories. In addition, he is working on a children's book and a book of short stories about his early life on a farm in central Illinois. Ortman married Lisa Kerpoe in September 2000. His oldest daughter recently graduated from UIUC with her teaching degree in Math and Spanish, and his youngest daughter transferred to Illinois this year and is majoring in engineering.

1980s

Barbara A. Devine, MBA (BS Microbiology '87) is a sales representative for American International Chemical, Inc., Midwest Region. The company, headquartered in Boston, MA, is a sales and marketing organization that distributes specialty chemicals to the pharmaceutical industry. She had previously worked 12 years for Abbott Laboratories.

Estelle S. Fletcher, MD, PhD (BS Physiology and Psychology '81) is assistant director of the Family Practice Residency Program, Family Physicians of Naperville (IL), sponsored by Provena Saint Joseph Medical Center.

Nancy J. Bender Hausman, MD (BS Biology Honors '88) is a physician specializing in neurology and sleep medicine at the Marshfield Clinic, Marshfield, WI. She married Fred Hausman in 1997.

Helen Lo, DDS (BS Biology '87) opened her dental office in Woodridge, IL, in 1999. She received her DDS from the University of Illinois College of Dentistry in 1991.

Kristine Lowe (BS EEE '89) received her PhD degree from Georgia Tech in 1999. She has taken at postdoctoral position at the Naval Research Lab in Washington, DC.

Mark Revenaugh, DVM (BS Biology '85) is working with the US Equestrian Team as the official USET veterinarian. He has traveled with the team to Italy, Sweden, England, Germany, Mexico, and Canada. He is a horse veterinary practitioner in northern New Jersey.

1990s

Rudaina H. Alrefai (PhD Biology '93) is consumer safety officer for the Food & Drug Administration, Center for Food Safety and Applied Nutrition, Washington, DC. From 1996-98, she was awarded an intramural research fellowship at the National Institute on Aging.

Jason A. Cohan (BS Biology '97) is an analytical quality assurance lab technician at Abbott Laboratories. He says, "There are a lot of good oppor-

tunities at Abbott Laboratories for UI life sciences graduates."

Heather (Reichert) Hodge, JD (BS Biology Honors '90) is a patent attorney for Motorola. Husband David is the Chicago Wilderness Land Steward for The Nature Conservancy. They welcomed their first child, Megan Elizabeth, in May 1999.

Natalia Izquierdo-Schlipman (BS Biology '95) is a pharmaceutical sales representative, US Ophthalmics/Primary Care, CIBA Vision, a division of Novartis. She married Joseph Schlipman, who is a financial analyst with Ameritech, in May 1999. They make their home in the downtown (Gold Coast) area of Chicago.

Jody Y. Lin, MD (BS Biology '91) finished his residency in Obstetrics and Gynecology at Washington University at St. Louis in July 1999. He is in private practice in OB/Gyn and on staff at La Grange Memorial.

Marc A. Mickiewicz, MD (BS Biology Honors '95) is a resident physician in Emergency Medicine at the University of Michigan, Ann Arbor.

David G. Nekoukar (MS Plant Biology '95) is a senior assistant biologist at E.I. DuPont de Nemours & Company, Newark, DE. He is working in the agricultural biotechnology department on modifying starch synthesis in maize using genetic approaches.

Sam Volchenbom, MD (BS Biochemistry and Biology Honors '91) is a pediatric resident at the Children's Hospital Medical Center, Cincinnati, OH. In July 2001, he will become a fellow in pediatric hematology/oncology at Boston Children's Hospital. He and wife Julie have two children.

Bradford Lee West (BS Biology Honors '98) is in medical school at the University of Illinois, Chicago. He says, "The University of Illinois put me in the top 15% of the entering class of the UIC-COM. My MCAT scores were far better than people that went to Harvard, Yale, Notre Dame, and many other big name universities." He graduated from Illinois with distinction based on research done in V. Gelfand's laboratory.

2000s

Nicole L. Collins (BS Biochemistry '00) received a National Science Foundation Graduate Research Fellowship to pursue her doctoral degree in biological and biomedical sciences at Harvard Medical School.■

in memory

Joseph L. Jordan, MD, JD, PhD (MS Biology '68) died October 12, 1998. He was a doctor in the Family Medicine Center, Albany, GA.

Mary (Betty) Joliffe Robertson (MS Zoology '59) died August 4, 1999, of lung cancer at her home in Homestead, FL. Her husband, **William B. Robertson, Jr.** (MS Zoology '49, PhD Zoology '55) died January 28, 2000, of an apparent heart attack, also at home in Homestead. Together, Bill and Betty conducted a 40-year study of sooty terns at Dry Tortugas, FL. Bill was a biologist at Everglades National Park from 1951 to 1997, studying bald eagles, crocodiles, and wading birds, and doing pioneering research into the role of fire in maintaining ecosystems. Shortly before his death, the National Park Service awarded him its citation for meritorious service. Bill and Betty are survived by two daughters and a son. Contributions may be made to the Robertson Scholarship Fund, c/o Timothy Keyser, P.A., P.O. Box 92, Interlachen, FL 32048.■

staff notes

Several staff members retired this year. **Helen M. Birdsell**, account technician, retired from Molecular & Integrative Physiology after 22 years of service. **Jerry D. Heiser**, lab animal care technician, retired with 32 years of service. **Sheila L. Hardyman**, staff secretary in Plant Biology, and **Arlene Webb**, staff secretary for the Biology Advising Office, both retired with 35 years of service.■

Ilana Strubel, DVM (BS EEE '90), in addition to practicing veterinary medicine in Pacifica, CA, is active in PAWS—Pets are Wonderful Support—in San Francisco.



Strubel with Timna

PAWS is a volunteer, non-profit group that helps improve the quality of life for low-income pet owners with HIV disease. The group provides comprehensive services to enable clients to keep their companion animals. Services include an animal food bank, subsidized veterinary care, dog walking, litter box maintenance, grooming, and foster care and adoption when necessary.

PAWS plays an important role in educating the medical and veterinary communities about benefits and risks of animal companionship for immunocompromised individuals.

San Francisco PAWS provides comprehensive care for about 300 individuals and their 500 pets. Strubel served as PAWS' president in 1998 and 1999, and remains on its Board of Directors.

Strubel recently chaired PAWS' international summit on *The Healing Power of the Human-Animal Bond: Lessons Learned from the Aids Epidemic*. This conference brought veterinarians, medical doctors, social workers, nurses, shelter representatives, animal-assisted therapy professionals, mental health professionals, recreational therapists, allied health professionals, and students together to discuss the role of animal companions in society and to promote the evolution of new and improved human-animal support services through the Bay Area and beyond.

Strubel is also involved with the San Francisco Society for the Prevention of Cruelty to Animals, which is working to find homes for 100% of the city's adoptable dogs and cats.■

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Giving Back to the University...

Guerreros Establish Endowment for New Lecture Series



Jorge and Mary Anne Guerrero established an endowment in 1999 to fund a rotating lecture series between Life Sciences and the College of Veterinary Medicine. The lectures are named the “Dr. Paul H. Silverman and Dr. Jorge and Mary Anne Guerrero Lecture in Immunology” and the “Dr. Norman D. Levine and Dr. Jorge and Mary Anne Guerrero Lecture in Veterinary Parasitology” in honor of Jorge’s two mentors at the University of Illinois. “These two men were like fathers to me—they changed my life. I have been so fortunate in my life and I am so grateful for the role that the University of Illinois has played in it,” Jorge said recently.

Jorge received his MS in zoology in 1969 and his PhD in zoology in 1971. He is head of veterinary services for the North American Operations of Merial. Mary Anne received her MA degree in Spanish in 1969 at Illinois. She is chair of Foreign Languages, Stuart Country Day School, Princeton, NJ. They are the parents of a son and a daughter.



For more information on gift opportunities to benefit life sciences at the University, please call Dr. Kathy Carter, Director of Development, School of Integrative Biology and School of Molecular & Cellular Biology, University of Illinois at Urbana- Champaign at 877-265-4910 (toll free), or e-mail at kacarter@uiuc.edu.



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